Portable Field Dental Unit
Model 2100M

Operation And Maintenance Manual

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SECTION 1

INTRODUCTION

1.1 GENERAL.

The information contained in this manual covers the set-up, operation, maintenance, troubleshooting and repair of the Model 2100M Field Unit.

All authorized personnel who either operate, maintain or service the Field Unit should carefully review this manual. The system should be operated and maintained by trained personnel only.

1.2 CUSTOMER SERVICE.

In the event you require assistance with this system, please call 1(800) 445-8765 or (303) 790-2000 and speak with one of our Customer Service Representatives. Our service hours are from 8:00 a.m. to 5:00 p.m., Mountain Standard Time, Monday through Friday excluding holidays.

1.3 DESCRIPTION OF SYSTEM.

The Model 2100M Field Unit is a light-weight, self-contained portable dental operating and treatment unit designed for field or operatory use. The system includes an oilless air compressor that provides power to the dental instruments and air-driven vacuum system. The delivery unit supports a Midwest Tradition L fiber optic high speed handpiece, Midwest Rhino low speed handpiece, three way syringe, saliva ejector and high volume evacuator. The system contains a self-contained water supply for handpiece coolant and oral irrigation and a waste container for collection of liquids and debris from the evacuation system.

The system contains all necessary tubings and standard electrical connections for operation.

The entire unit can be quickly disassembled and repacked into two rotationally molded carrying cases for safe transportation and storage. The cases not only act to protect the system but also provide the structural housing for the unit.

1.3.1 Compressor Module: The Compressor Module consists of 1½ HP oilless air compressor system that provides > 3.8 scfm of free air at 40 psi. The compressor consists of a reciprocating, one cylinder piston that utilizes a teflon coated cylinder wall and teflon ring piston for lube-free operation. The 1½ HP electrical motor operates from a 115V/60Hz or 230V/50Hz electrical supply. The system is air-cooled and incorporates an after-cooler to reduce the operating temperature of the compressed air.

Features:

- Fan induced air cooled system
- 1½ horsepower electric motor
- Aluminum, oilless compressor pump with teflon coated cylinder wall and teflon piston ring
- Coiled compressed air aftercooler
- Pressure switch and unloader system
- (1) 10 foot hospital grade NEMA 5-15 electrical cord (115Vac/60Hz)
- (1) 10 foot CEE-7 cord (230Vac/50Hz)
- Grounding cable
- Rotationally molded, polyethylene carrying, storage case with recessed hardware and removable end caps

1.3.2 Delivery Unit Module: The delivery unit contains a fold out control unit for placement of the instrumentation and provides a work surface for the instrument tray. The delivery unit contains the ~~handpieces~~, control blocks, water supply, and an air reservoir with regulators ~~and a fiber optic lighting system for the high speed handpiece~~. The unit also contains an air operated vacuum system to power the High Volume Evacuator (HVE) and Saliva Ejector. The Vacuum system includes a removable waste container with automatic overflow protection.

Features:

- Autoclavable stainless steel, instrument tray
- Two handpiece control system
- Two straight asepsis handpiece tubings with Midwest connectors
- Aseptic non-retraction water coolant
- Variable speed disc type foot control with coolant water switch
- Three-way syringe with coiled tubing and removable, autoclavable tip
- Pressurized water container with 35 Micron water filter
- Water coolant flow control for each handpieces.
- Water flush system
- Individual drive air pressure adjustment for each handpiece
- Individual pressure gauges for handpiece drive air, water, vacuum and air tank
- Repair kit
- High volume evacuator control (autoclavable) with straight tubing
- Saliva ejector control (autoclavable) with straight tubing
- Air driven vacuum pump
- 6 foot suction exhaust vent tubing
- Waste container with automatic overflow shutoff
- (1) 10 foot hospital grade NEMA-515 electrical cord (115 Vac/60 Hz)
- (1) 10 foot CEE-7 cord (230 Vac/50Hz)
- Rotationally molded, polyethylene carrying, storage case with recessed hardware

1.4 PRINCIPALS OF OPERATION.

1.4.1 AIR COMPRESSOR MODULE.

Air Compressor Pump: The air compressor pump is powered by a 1½ HP electric motor that drives a reciprocating piston. To compress air, the piston moves up and down in the cylinder. On the downstroke, air is drawn in through the air intake muffler. The exhaust valve remains closed. On the upstroke of the piston, air is compressed. The intake valves close and compressed air is forced out through the exhaust valve and then through the air hose to the delivery unit.

The compressor pump uses a teflon ring piston and teflon coated cylinder sleeve to eliminate the need for an external lubricant.

1.4.2 COOLING SYSTEMS.

A special operating problem with compressors is the dissipation of heat generated. A basic law of thermodynamics and the law of conservation of energy dictates that if a fluid (air) is compressed, the energy will be concentrated resulting in an extreme rise in the temperature of the compressed gas.

The compressor system employs two cooling systems for dissipation of heat.

a) Fan Induced Cooling - The air compressor module employs fans that blow ambient air through the case housing to cool the compressor pump and electric motor.

b) Aftercooler - The compressed air is cooled using coiled tubing that is placed immediately after the exhaust valve to dissipate heat to the surrounding cooling air. The aftercooler serves to substantially lower the temperature of the air to an operating level and to assist in the condensing and subsequent removal of moisture from the air to achieve an acceptable dry operating air.

1.4.3 PRESSURE SWITCH AND UNLOADER.

The air compressor module includes a pressure switch that automatically turns the system on and off as needed to maintain the required operating pressure. An unloader is placed to eliminate back air pressure against the piston whenever the unit turns off to prevent the motor from having to start again under load.

1.4.4 DELIVERY UNIT MODULE.

Compressor air is taken in by the delivery unit and stored in an air tank at a pressure of 100 psi until used. Air is taken from the air tank and routed through the Air/Filter Regulators that reduce the air pressure to the desired operating levels and filters out any remaining moisture droplets from the compressed air.

1.4.4.1 Handpiece Operation: Compressed air is used by the handpieces to drive turbines in the head of the handpiece that rapidly spin the cutting bur. Compressed air is also released by the head of the handpiece to provide additional cooling of the tooth while drilling.

1.4.4.2 Water System - The fresh water system is pressurized by the compressed air to provide the water pressure necessary for operation of three way syringe, water coolant spray for the handpieces and the handpiece flush system.

1.4.4.3 Evacuation System - Suction for the evacuation system is created using a (venturi) pump powered by compressed air. The venturi principle is used to accelerate the speed of the air stream which creates a negative pressure or vacuum surrounding it.

The vacuum created is used to pull air, liquids and debris through the HVE and Saliva Ejector into the collection container which separates the air from the liquid and solids.

1.4.4.4 Drain System - The delivery module has a an automatic drain as well as a manual drain. The automatic system will drain the air tank for 1/10 of a second when the compressor cycle starts.

1.5 PERFORMANCE CHARACTERISTICS.

The system operates on 115/230 Vac/50/60 Hz with the maximum power requirement less than 1500 Watts.

The system is able to perform under the following environmental conditions.

Temperature:	30^0 to 120^0 Fahrenheit (-2^0 to 49^0 C)
Altitude:	0 to 8,500 Feet (0 to 2,591 meters) above sea level
Humidity:	0 to 95% relative humidity

1.6 EQUIPMENT NOT PROVIDED.

1) Electrical Power Source
2) Consumables which include:

    a) Oral Evacuation Tip
    b) Saliva Ejector Mouthpiece

3) Handpieces

1.7 SPECIFICATIONS, CAPACITIES AND TECHNICAL DATA.

COMPRESSOR MODULE:

Dimensions:	19.85" (.504 m)L x 10" (.254 m)W x 19" (.482m)H
Cube:	2.18 f^3 (.061 m^3)
Weight:	62 lbs. (28.1 Kg)
Electrical:	115 Vac/60 Hz, 9.418 A, 1136 W
	230 Vac/50 Hz, 4.920 A, 1082 W
Duty Cycle:	50%
Operating Pressure:	75-100 psi (551,580 - 689,475 Pa)
Air Flow @ 40 psig:	3.8 SCFM (.0018 m^3/s@ 275,790 Pa)
Air Flow @ 90 psig:	2.2 SCFM (.0010 m^3/s@ 620,528 Pa)

DELIVERY UNIT MODULE:

Dimensions:	23.63" (.600 m)L x 16.5" (.419 m)W x 14.125" (.358 m)
Cube:	3.08 ft^3 (.086 m^3)
Weight:	47 lbs. (21.29 Kg)
Center of Gravity:	Below Midpoint
Electrical:	115 Vac/60 Hz, 295.6 mA, 33 W
	230 Vac/50 Hz
Air Tank:	3.39 Quart (.0037 m^3)
Water Container:	1.06 Pint (.0005 m^3)
Regulator Filter:	5 Micron
Water Filter:	35 Micron
Air Regulator Pressure:	58 psi (399,895 Pa)
Water Regulator Pressure:	30 psi (206,842 Pa)
Vacuum Regulator Air Pressure:	45 psi (310,397 Pa)
Vacuum Regulator Pressure:	35 psi (242,316 Pa)
Vacuum Container:	2 Quart (.0019 m^3)
HVE:	12" Hg (40,512 Pa)
	4.2 f^3/min. (.002 m^3/s)
Saliva Ejector:	12" Hg (40,512 Pa)
	1.2 f^3/min. (.00056 m^3/s)

1.8 DNTL LIMITED WARRANTY.

DNTL Corporation warrants this product against defects in material or workmanship for one year from the time of delivery (except for handpieces which have a warranty of six months). DNTL will pay labor and standard freight costs for warranty service for a period of 90 days from the time of delivery. This warranty does not cover consumable type items including light bulbs.

DNTL Corporation's sole obligation under said warranty is to repair, or at its option, replace the defective part. The buyer shall have no other remedy. All special, incidental and consequential damages are excluded.

The warranty shall be voided by alterations of equipment except by DNTL Corporation, or tampering with, improper installation or maintenance, accident or misuse. This warranty expressly excludes all damage to these products resulting from careless or neglectful transportation.

DNTL shall in no event be responsible for any warranty work done without first obtaining DNTL's written consent.

This warranty is made expressly in lieu of all other warranties, expressed or implied, including any implied warranties of merchantability or fitness for particular purpose. No employee, agent, franchise, dealer or other person is authorized to give any warranties of any nature on behalf of DNTL Corporation. Except as provided herein, DNTL shall have no liability or responsibility to customer or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused directly or indirectly by "equipment". Notwithstanding the above limitations and warranties, DNTL's liability hereunder for damages incurred by customer or others shall not exceed the amount paid by customer for the particular "equipment" involved.

1.9 SAFETY PRECAUTIONS.

In addition to observing the normal precautions associated with standard dental practices and procedures, the following precautions should be noted during the set-up, operation and maintenance of this system. This information relates to YOUR SAFETY and PREVENTING EQUIPMENT PROBLEMS:

What to Look For	What Could Happen	How to Prevent It
Hot Parts	The top of the compressor, and aftercooler get hot when the compressor is running. If you touch them, you may be seriously burned.	Allow unit to cool before servicing. Ne touch the top of the air compressor o aftercooler during or immediately aft operation. Allow at least 15 minutes to co
Flammable Vapors	It is normal for the motor's electrical contacts to spark when the compressor starts or stops. A spark can ignite flammable vapors from gasoline or solvents, causing an explosion or fire.	The air compressor must only be used in w ventilated areas, free of gasoline or solve vapors. Do not operate the compressor while you a carrying it.
Compressed Air	The compressed air system designed for operation with this system is under high pressure. Compressed air may propel dust, dirt or loose particles it comes in contact with and can cause serious injury or damage. Too much air pressure could cause certain components to rupture or explode.	**Always turn the air compressor off and pur the air tank to bleed off all air pressure befor attaching or removing air lines or accessories.** Inspect the air hose before each use. Repla it if it is damaged. Never adjust the pressure switch or regulators to exceed the recommended settings. If th system exceeds the recommended air pressur and fails to shut-off, unplug the compresso immediately, bleed the air system and repair or adjust before resuming use.
Electricity	The system is powered by 115-230 volts of electricity. Like any other electrically powered device, if it is not used properly, it can cause Electrical Shock. During maintenance, you could be exposed to voltage sources which can cause an Electrical Shock.	Never use system in the rain or in wet conditions. Always plug the cord into an electrical outlet with the specified voltage and adequate fuse protection. Always unplug the system before doing any maintenance or repair.

What to Look For	What Could Happen	How to Prevent It
Electricity (cont.)	Improper grounding can result in a risk of electrical shock. In the event of a short circuit, grounding reduces the risk of shock by providing an escape wire for the electric current.	Ensure that the system and electrical source are properly grounded. All electrical maintenance and repair should be performed by a qualified electrician.

SECTION II

EQUIPMENT SETUP

2.1 DELIVERY UNIT.

2.1.1 Place the delivery unit on a level work surface. During set-up inspect both the compressor and delivery units for external and internal damage to the case and components.

2.1.2 Relieve pressure in case by depressing button on Automatic Breather Valve. (figure 2.1)

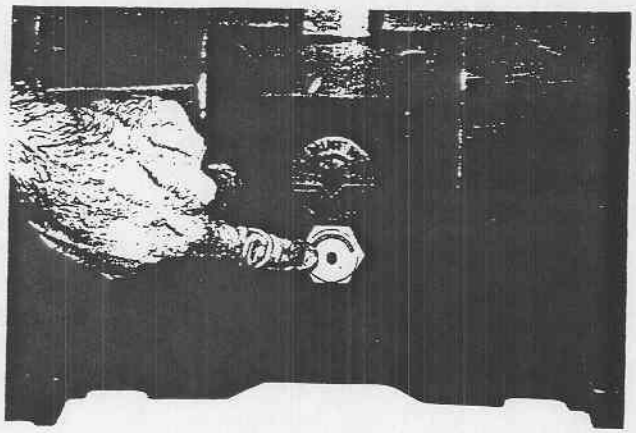


Figure 2.1

2.1.3 Release latches by turning latch clockwise. (figure 2.2)

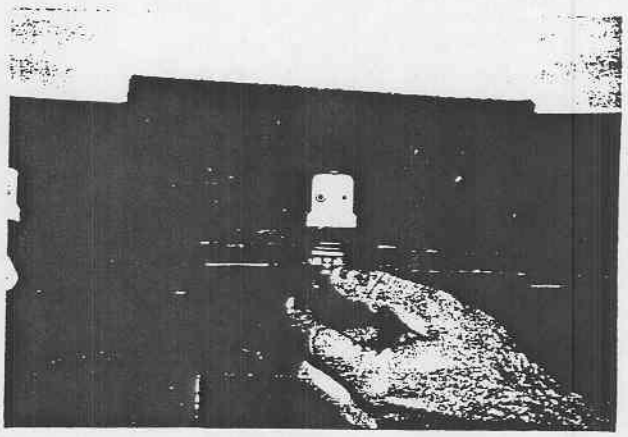


Figure 2.2

2.1.4 Open delivery unit lid and lock lid supports into place. (figure 2.3)

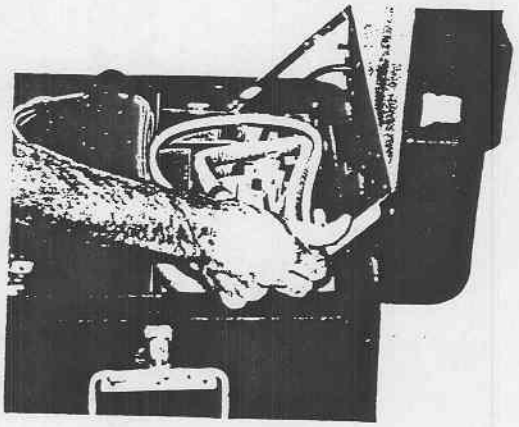


Figure 2.3

2.1.5 Raise Handpiece/Instrument Shelf and lock shelf supports into place. (figure 2.4)

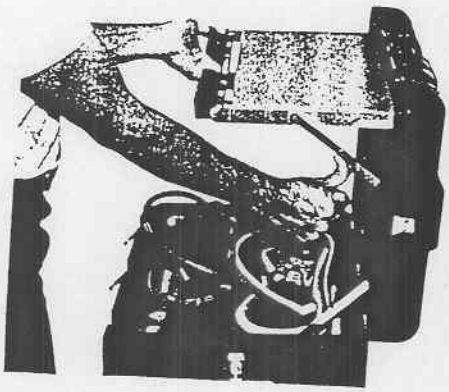


Figure 2.4

2.1.6 Remove stainless steel instrument tray from behind Handpiece/Instrument Shelf and place onto center of shelf. (figure 2.5)

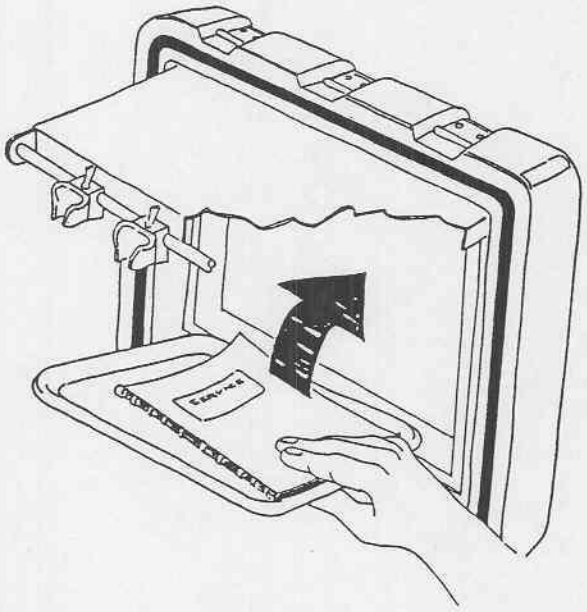


Figure 2.5

2.1.7 Remove the handpiece tubing from storage area and place into the holders on the far left of the handpiece holder bar.

2.1.7.1 Remove the syringe from the storage area and place into the center holder.

2.1.8 Remove foot control from storage. (figure 2.6)

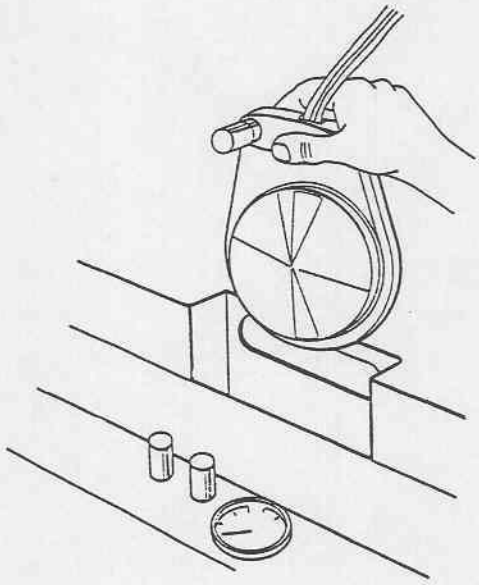


Figure 2.6

2.2 WASTE CONTAINER CONNECTIONS.

2.2.1 The HVE and Saliva Ejector tubings are stored in the compressor end caps. Connect HVE tubing (1/2") by firmly pushing the tubing into the 1/2" quick disconnect on top of the waste container. Connect saliva ejector tubing (1/4") by firmly pushing onto 1/4" fitting on top of waste container.

Connect vacuum tubing (5/8") by firmly pushing into 5/8" fitting on lid of waste container.

The vacuum tubing extends from the right center of the delivery unit.

Connect drain system with the 1/4 subminiature quick disconnect.

2.2.2 Place the HVE and Saliva Ejector valves in the handpiece holders (on the right). (figure 2.7)

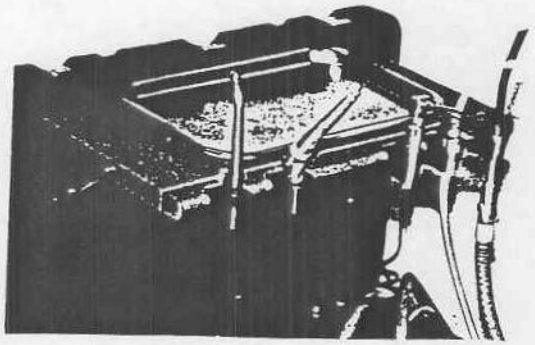


Figure 2.7

2.3 WATER CONTAINER.

2.3.1 The water container is located in the back center of the delivery case. To open the lid, turn water pressure relief toggle into the off position to relieve all air pressure then disconnect both the water and air lines (male quick disconnects) Remove the cap and fill to approximately 1" below the top edge with either distilled water. Replace the cap, tighten and reconnect the water and air lines. Place the container back into its holder.

2.3.2 If the water in your area contains a moderate to high level of mineralization (hard water), it is recommended to only use distilled water to prevent unnecessary failure of handpieces or damage to the control panel components, thus prolonging the life of the entire system.

2.4 COMPRESSOR SET-UP.

2.4.1 Operate the air compressor in a dry, clean, cool and well ventilated area. The air intake muffler must be kept clear of obstructions which could reduce air delivery of the air compressor. The air compressor pump and case are designed to allow for proper cooling. Clean or blow off dust or dirt that collects on the air compressor filter. The filter is located inside the compressor case and should be changed when the piston and cylinder are changed. A clean air compressor runs cooler and provides longer service.

2.4.2 Place the compressor on a level surface eight to ten feet away from the delivery unit.

2.4.3 Remove both end caps by releasing the two latches on each side and latch on the top and bottom of the case. (figure 2.8)

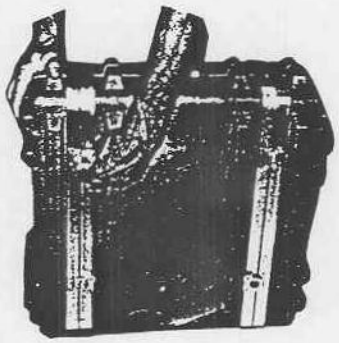


Figure 2.8

2.4.4 The ventilation openings on your air compressor are necessary to maintain proper operating temperature. Do not place objects or other obstructions on or near these openings.

2.4.5 Remove electrical cord sets, air hose, HVE and saliva ejector tubings and exhaust line from the end caps and place end caps in an area separate from the work area.

Attach air line from compressor by pushing female quick connect on end of air line onto male coupler located in on the right side of the delivery unit control panel just behind the pressure gauges.

2.4.6 Connect the power supply cord to the compressor and delivery modules.

2.4.7 If extra distance is required to the electrical source, use extra air hose instead of an extension cord to avoid voltage drop and power loss to the motor.

If you must use and extension cord, be sure it is:

a) A 3-wire extension cord that has a 3-blade grounding plug, and a 3-slot receptacle that will accept the plug on the compressor.
b) In good condition.
c) 50 feet or shorter.
d) 10 gauge (AWG) or larger. (Wire size increases as gauge number decreases.) 10 AWG and 8 AWG, may also be used. Do not use 12 AWG or thinner.

SECTION III

OPERATION

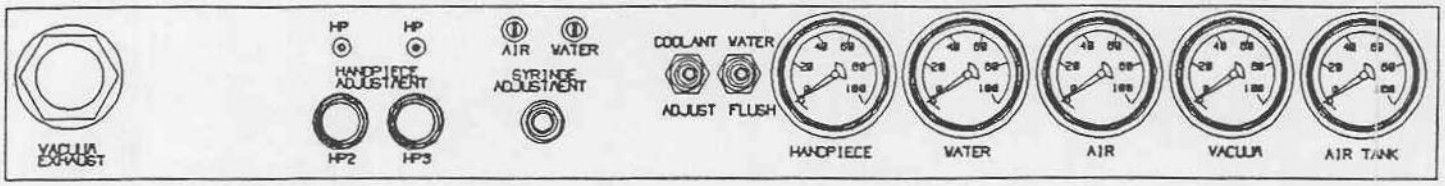


Figure 3.1

3.1 PREPARATION FOR USE.

3.1.1 Install a sterilized syringe tip, HVE and saliva ejector mouthpiece.

3.1.2 Install the desired cutting instrument bits into the handpieces.

3.1.3 Turn the power switch to the "ON" position on the compressor unit.

3.1.4 Turn the power switch to the "ON" position on the compressor unit. Allow the air compressor several minutes to build up pressure to the air tank and system. The compressor will shut off automatically when the system has reached the required pressure.

3.1.5 Check the System Pressure Gauges

Water Pressure:	30 psi
Air Pressure:	58 psi
Vacuum Pressure(1):	45 psi
Air Tank Pressure:	75-100 psi

(1)NOTE: lift the HVE from its holder to check vacuum pressure.

3.1.6 Place the Foot Control in a comfortable position for operation. The foot control valve controls the handpiece speed and provides an air signal for the air and water coolant and fiber optic light. The foot control has a water ON/OFF toggle for activation of coolant water to the handpieces.

3.1.7 Check and adjust the Control Functions (figure 3.1)

3.1.7.1 **Drive Air Adjustment Screws:** Each handpiece can be independently set by adjusting the screws in the middle of the control panel. Clockwise to decrease, counterclockwise to increase. A small flat screwdriver is required. (figure 3.2)

Remove each handpiece from its holder and depress the foot control to its max and read the handpiece air pressure gauge (located to the right of the drive air adjustment screws). Set handpiece to the manufacturer's recommended pressures by turning the adjustment screw. (figure 3.2)

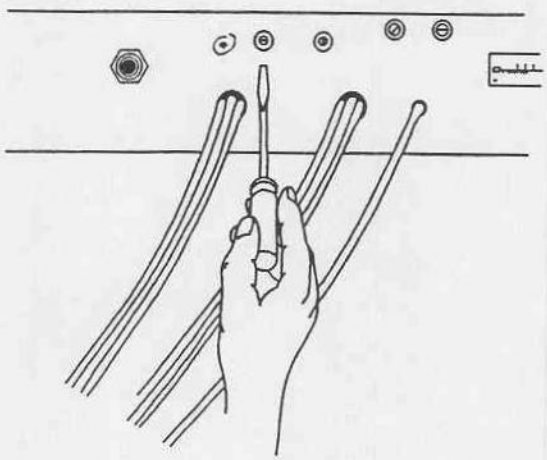


Figure 3.2

3.1.7.2 **Water Coolant Flow Control**: Adjusts the flow of water coolant to the handpieces. Clockwise to decrease, counterclockwise to increase. Turned fully clockwise, it completely shuts off the water coolant. Adjust the spray to the desired rate for the procedure to be performed.

3.1.7.3 **Fiber Optic Illumination Control**: Remove the handpiece from its holder and depress the foot control to activate. Adjust the lamp control to achieve the desired illumination for the handpiece. Clockwise to increase and counterclockwise to decrease.

3.1.7.4 **Three Way Syringe Water Flow Controls**: The syringe is a 3-Way air/water syringe. By depressing either the air (left side) or water (right side) of the valve cartridge, you will activate an independent flow of the desired source. By pressing the center of the buttons, the result will be an air/water spray. Operating water pressure must not exceed 30 psi and air pressure must not exceed 60 psi.

Air and water flows have been preset to provide air, water and mist. To independently adjust the flow of air or water, turn the adjustment screws clockwise to decrease and counterclockwise to increase. (figure 3.3)

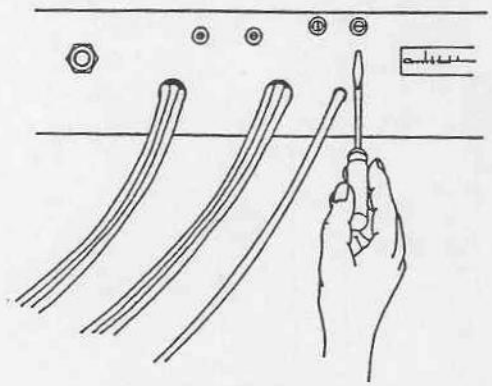


Figure 3.3

3.1.8 **Handpiece Flush:** The handpiece flush system allows you to quickly and thoroughly flush your handpieces and handpiece tubings. To operate, use the system as follows:

3.1.8.1 Locate the handpiece flush valve in the center of the control panel.

3.1.8.2 Hold the handpieces to be flushed over a sink or some type of receptacle. Be sure the handpieces are directed away from you and into the receptacle.

3.1.8.3 Fully open water flush valve (counterclockwise) for about 5 seconds which will force about 5 milliliters of water through each handpiece.

3.1.8.4 Turn off the flush valve and return the handpieces to their holders.

It is recommended to use the Handpiece Flush System for about 5 seconds after every patient and for about 20 seconds at the end of each day.

To flush the syringe, depress the water button on the syringe for 15 seconds.

3.1.9 The system is now ready for use.

3.2 SYSTEM SHUT DOWN.

The following steps should be followed after each use of the system or prior to storage or transporting of the equipment.

3.3 WASTE CONTAINER.

To empty the waste container, place both the saliva ejector and HVE handpieces into the automatic handpiece holders. Grasp the base of the container and push up on the lip of the lid with both thumbs. Empty the container. Reattach the lid to the container, insuring a tight connection. Flush HVE handpiece and tubing with 500 ml (½ qt.) of a liquid oral evacuation cleaner. Mix according to the manufacturer's directions. Empty the container and then reattach the lid. Flush the saliva ejector handpiece and tubing with 500 ml (½ qt.) of liquid oral evacuation cleaner. Remove screen in saliva ejector tip and clean or replace. Empty container, disconnect the HVE and saliva ejector tubings and wipe down with a disinfectant. Coil tubings into compressor end caps.

3.4 FRESH WATER FLUSH.

The unit should be flushed of all water at the end of each day and prior to storage.

NOTE: This procedure does not replace the need to flush the handpieces between patients. Refer to Handpiece Flush in the operation section of this manual.

To properly purge the water from the system, hold handpieces over a sink or receptacle and fully open the water flush valve (counterclockwise). Purge all water from the syringe by depressing the water button on the syringe until air begins to pass through the syringe. Turn the water pressure relief toggle into the off position to relieve pressure. Disconnect both the water and air quick disconnects. Empty any excess water and thoroughly clean the container. **Do not use** liquids other than water or a mild soap to clean this container.

3.5 SYSTEM PURGING.

Purge moisture from the air tank by opening the System Drain Valve located between the water and waste containers. After all moisture has been purged from the tank, turn off power switches on the compressor and delivery unit then continue to purge the system until all air has been released.

CAUTION

Open System Drain Valve slowly when draining the system. This unit contains a high air pressure that could cause injury if released to quickly.

3.6 CLEANING PROCEDURES

CAUTION

Unplug all electrical connections before cleaning unit.

3.6.1 Disconnect cord sets, exhaust line and air line, clean with a liquid disinfectant.

3.6.2 Thoroughly clean the unit by applying a disinfectant to a soft cloth then wipe down all tubings, instrument tray and all exposed surfaces.

3.6.3 Clean and lubricate the handpieces, as specified by the manufacturer.

3.6.4 Clean syringe with a small brush and isopropyl alcohol. The syringe ~~tip~~ is autoclavable.

NOTE: Never submerge syringe in a chemical disinfectant, ultrasonic cleaner or cold sterilization solution.

SECTION IV

PREPARATION FOR STORAGE OR SHIPMENT

Conduct all the steps given in the system Shut-Down Procedures and perform the following steps:

4.1 REPACKING

4.1.1 Remove handpieces and store in manufacturer's boxes.

4.1.2 Place the handpiece and syringe tubings and syringe into the tubing storage (figure 4.1)

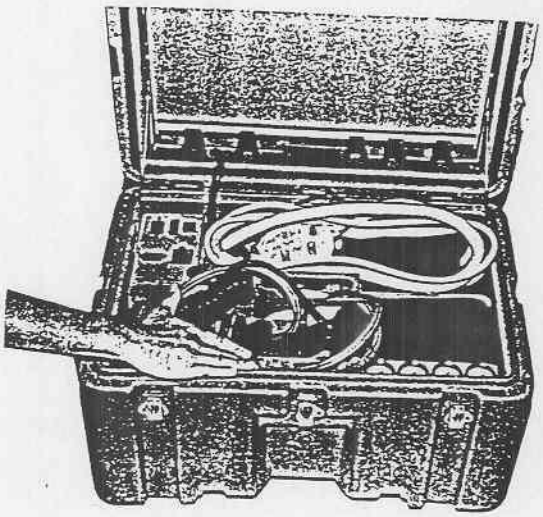


Figure 4.1

4.1.3 Place instrument tray and operation manual under handpiece/instrument shelf (figure 4.2) and fold down shelf.

Place foam pad between delivery unit and instrument tray.

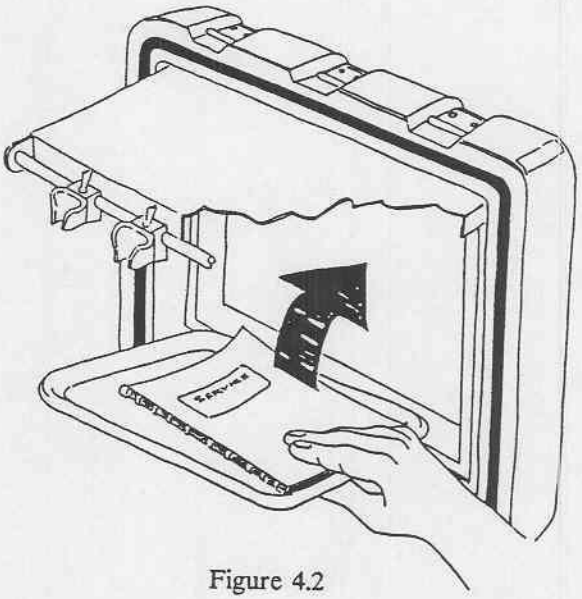


Figure 4.2

4.1.4 Shut lid on delivery unit and close latches. When the latches are in the closed position, they should be flat against the case, failure to do this may cause damage to the latch during shipment.

4.1.5 Coil the air hose, cord sets, HVE and saliva ejector tubings and exhaust line and place into the end caps on the compressor.

4.1.6 Attach end caps to the compressor and close latches.

4.2 STORAGE.

The following storage instructions apply to storage either indoor or outdoor.

The ideal storage temperature is between 32°F (0°C) and 100°F (37°C); however the field unit can be stored in temperatures ranging from -40°F (-40°C) to 140°F (60°C) if no other options exist. Storage in temperatures out of these ranges could cause permanent damage to the unit.

Prior to storage, follow the cleaning and repacking instructions for the field unit to insure proper storage. Once in storage, the field unit will not need to be inspected until it's removed from storage.

Once removed from long term storage, the following items will need to be inspected, lubricated or replaced.

Part Description	Qty.
O-RINGS:	
Water Regulator	1
Air/Filter Regulator	2
Water Container	1
Water Relay	3
Air/Water Syringe	7
Foot Control	5
Needle Valves	2
Handpieces	
Low Speed	
High Speed	
Quick Disconnects	
1/4" Water In/Out Female	1
1/4" Water In/Out Male	1
3/8" Air In Brass Quick Disconnect	1
Automatic Handpiece Holder Valves	3
Suction Handpieces (HVE & LVE)	3
Syringe Block	2
Water/Air Coolant Block	2
Push Lock Fittings	4
Quick Coupler Fittings	5
System Drain Valve	1
Compressor, Pump	1
Solenoid	1
Waste Container Automatic Shut-off	1
Waste Container Quick Disconnects	2
GASKETS	
Compressor, Pump	1
Delivery Case, Neoprene Seal	1
Compressor Case, Neoprene Seal	2
Automatic Breather Valves	2
Automatic Dual Handpiece Block	1
Venturi Suction	1
GROMMETS	
Compressor, Air Hose 1 1/16	1
Delivery Unit Wire Grommets	2

SECTION V

MAINTENANCE

5.1 EQUIPMENT CARE AND INSPECTION.

5.1.1 The equipment should be thoroughly cleaned and disinfected after use each day to maintain optimal performance.

The following visual checks and inspections should be performed before operating the unit:

- Look for mechanical damage that could affect safe operation.
- Insure there are no missing parts or accessories
- Inspect components for tightness, rust, cracks, wear and frayed electrical cords.

Should mechanical or other damage be evident that would affect the safety of use or operation, the system should not be used until repair or replacements, correcting the defects are made.

5.2 GENERAL SERVICE INFORMATION.

5.2.1 When servicing components that have rubber gaskets or diaphragms, it is generally advisable to install new ones when reassembling the components. If the old gasket or diaphragm is to be reused, carefully check for pin holes or cracks.

Before installing O-rings, always apply a light coating of silicone grease. This makes installation easier, and will prevent the O-rings from being damaged. The seal bores should also be lightly lubricated before inserting the stems or pistons.

When trouble shooting the system, bear in mind that although this tubing is resistant to crimping, it nevertheless can become crimped and obstruct the flow. Crimps are often caused by the tubing being too short, so that it is stretched at the barb connection. Remember when installing any tubing to allow adequate length. (slack tubing rarely becomes crimped)

When servicing dental systems, the parts of any component disassembled should be thoroughly cleaned and inspected for defects before reassembly. Any wiping should be done with a soft, lint free cloth. Flush all parts with clear, hot water, then rinse them in isopropyl alcohol.

Periodic maintenance inspections and any consequent service should be accomplished by trained service personnel only. Neither the inspection nor service is part of the equipment warranty.

5.3 TESTING EQUIPMENT AND TOOLS REQUIRED. (figure 5.1)

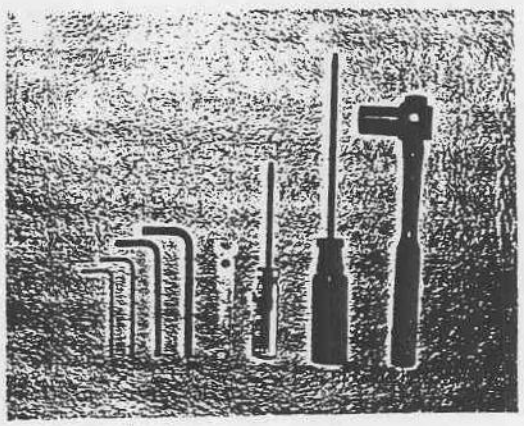


Figure 5.1

Flat Jewelers Screwdriver: (provided in the repair kit) Used for adjusting air and water pressure to handpieces and three-way syringe.

Flat Screwdriver: Used to remove screws from end panels of compressor module and the delivery unit frame.

Hemostats: Useful for temporarily stopping the air or water flow through tubing while troubleshooting or repairing the delivery unit.

Nut Driver 5/16": For removing hex head bolt from fan and motor shaft.

Ratchet & Socket 7/16" or Nutdriver 7/16": For removing bolts from compressor pump head.

Allen Wrenches: (Set of 4, provided with repair kit)

5/64" Used for accessing the switch mechanism in the automatic handpiece holder

3/32" Used for adhering the automatic handpiece holder to the support bar

1/8" Used for tightening the eccentric to the motor shaft

5/32" Used for tightening the Piston rod to the eccentric shaft

Syringe Tools: (Provided) This tool is used for removal of threaded barrel assembly. Be sure that the main air and water supply is turned off prior to servicing the syringe.

Air Pressure Test Gauge: Use an air pressure gauge with a 0-100 psi range, for use in checking air pressure at various points while troubleshooting the unit.

5.4 MAINTENANCE.

5.4.1 Regulator Filters: The air and water supplies pass through filters before entering the regulators. Filter elements should be serviced when they become sufficiently clogged to impede the flow to the regulators.

5.4.2 Checking the Filters: Connect the unit to its air supply. Be sure there is water in the tank, or that the water supply tube is connected to an external water source.

While pressing the syringe button, check the system pressure gauges. The maximum pressure drop for air is 15 psi; for water it is 10 psi. If the pressure drops below the numbers indicated while operating the syringe, the element is clogged and must be serviced.

5.4.3 Servicing: Remove the delivery unit frame from the external case. Pull up on center of delivery unit (cut out for hand) until unit is free from external case.

The air filter consists of a replaceable filter element which is housed in a bowl, and attached to the bottom of the regulator. It also serves as a moisture separator. Any liquid accumulations in the bowl can be released by opening the system drain valve or with automatic drain system.

To replace a clogged air filter element, turn off the main power switches on ~~both~~ the compressor ~~and delivery modules~~ and relieve all air pressure by opening the system drain valve. Disconnect the mini quick coupler located below the regulator bowls.

Unscrew the bowl from the regulator and then unscrew the filter element and replace.

5.5 WATER FILTER

The water is filtered by an in-line 35 micron filter with a reusable porous disc filter element.

5.5.1 Servicing: Disconnect the air/water supply tubes from the water container before servicing the filter. Relieve all air pressure by depressing the red button on the water container. Unscrew the filter housing, separate and remove the filter disc. Clean the disc with isopropyl alcohol and then thoroughly dry it with the air from the syringe or with the HVE. Be sure the O-ring is properly positioned when assembling the filter housing.

5.6 AIR INTAKE FILTER.

Air is drawn into the compressor and filtered to keep dust and other debris from entering the air system. Do not operate the compressor with the filter removed to prevent undue wear on the teflon components in the compressor pump.

CAUTION

Make sure the compressor has at least cooled down for 15 minutes.

5.6.1 Servicing: Keep the air intake filter clean at all times. A dirty air intake filter will not allow the compressor to operate at full capacity. When the filter becomes dirty, it must be cleaned or replaced. To replace the filter, pull out the tow pins holding the filter in place and replace with a new one. If it is dirty, simply pull it out and clean; you may wash it with a mild detergent and warm water.

5.7 AIR/WATER REGULATORS.

The operating air and water pressures to the instruments and vacuum devices are controlled through air regulators. The gauges inside the delivery unit indicate the regulated air and water pressure.

5.7.1 Checking the Regulators: The pressures should be as follows:

Water Pressure:	30 psi (- 5 psi)
Air Pressure:	58 psi (+/- 5 psi)
Vacuum Pressure:	45 psi (+/- 5 psi)

5.7.2 Servicing: Before adjusting the air or water regulators, verify that the air tank pressure is between 70-100 psi. Do not attempt to adjust the air regulator if supply pressure is less than 70 psi. Be sure there is water in the water container. Check the filters as explained in the **Filters** section before adjusting the regulators.

If adjustment of either the air or water pressure is required, turn the regulator knob clockwise to increase pressure or counter-clockwise to decrease pressure. When decreasing the water pressure, it is necessary to relieve the pressure in the system before reading the gauge. Do this by pressing the water syringe button.

5.7.3 Servicing the Air Regulator: The Air Filter-Regulators used are subject to three types of problems:

1) Clogged Filter Element
2) External Leakage
3) Internal Leakage

5.7.3.1 Filter Element: Service of the filter element is covered in the **Filter** section.

5.7.3.2. External Leakage: In the event of external leakage from the air filter-regulator, take the following action according to the point of leakage:

1) Leakage from the purge valve at the bottom of the filter bowl results from a loose or defective valve core. Try tightening the valve core. If the leaking persists, replace the valve core.

2) Leakage around the top of the filter bowl results from the bowl not being screwed tightly onto the regulator or from a defective O-ring seal. Try tightening the bowl. If the leaking persists, install a new O-ring.

3) Leakage around the top of the regulator results from a loose cover or a defective diaphragm assembly. If tightening the cover does not stop the leak, replace the diaphragm.

5.7.3.3 Internal Leakage: If the air pressure gauge indicates that the pressure creeps upward when the unit is not being used, there is air leaking past the inlet seal. This can normally be corrected by replacing or cleaning the poppet. When installing the new poppet, be certain that there is no foreign material on the sealing surfaces in the valve body.

5.7.4 Servicing the Water Regulator: External leakage around the inlet or outlet can be corrected by replacing the sleeve or replacing the internal o-ring. Leakage around the adjusting knob or erratic water pressure are indications of internal leakage. Install a new regulator.

5.8 THREE WAY SYRINGE.

The three way syringe is designed so that it can be easily serviced with the tools and parts contained in the repair kit.

5.8.1.1 Changing the Tip: Loosen retaining nut approximately three turns. Pull contaminated tip straight out. Push sterile tip in until reminder ring is not visible. Retighten retaining nut (hand-tight only).

5.9 AIR COMPRESSOR PUMP.

The air compressor pump contains a teflon ring piston and teflon coated sleeve. These parts should be replaced whenever the air compressor efficiency drops below the level required to maintain operation of the handpieces and vacuum system simultaneously or after 500 hours of operation.

5.9.1 Servicing: Before servicing the compressor, unplug the unit and disconnect the air hose from the delivery unit to relieve any pressure.

5.9.1.1 Removing the Piston Assembly: To access the compressor pump, it will be necessary to remove the end plate ~~opposite~~ of the exhaust side (air hose) of the compressor module housing. Use a flat screwdriver and remove the retaining screws and carefully remove the end plate.

Using the 5/16" Nut Driver, remove the Hex head screw from the inside of the fan mounted on the motor shaft and pull the fan from the shaft.

Using the 5/32" allen wrench, loosen the set screw on the piston rod assembly and pull the connecting rod forward from the bearing on the eccentric assembly.

Using a ratchet and deep 7/16" socket or 7/16" nut driver, remove the four machine screws from the top of the pump head assembly. Carefully lift the head assembly and valve plate assembly up to gain access to the piston and cylinder sleeve. Remove the O-ring from the bottom of the valve plate assembly. Pull the cylinder sleeve and piston up through the pump frame and discard.

5.9.1.2 Replacing the Piston Assembly: Using new replacement parts, drop the piston through the top of the cylinder sleeve. Be careful not to damage the piston's teflon ring or the teflon coating on the cylinder sleeve.

Place the piston and cylinder sleeve through the top of the pump frame and drop into place. Carefully align the slash mark on the top of cylinder sleeve to the back of the pump frame.

Push the piston connecting rod onto the bearing on the eccentric assembly, align and firmly tighten the set screw.

Place the O-ring onto the valve plate assembly and apply a small amount of o-ring lubrication to hold the o-ring into place. Be sure to guide the O-ring into place for proper seating and to prevent damage to the O-ring. Inspect the gasket and replace if worn. Ensure proper alignment of the o-ring valve plate, gasket and head, then carefully lower the entire head assembly onto the pump frame. Using the 7/16" socket and ratchet, replace the four screws and tighten.

Place the fan onto the motor shaft and replace and tighten the hex head screw.

Rotate the fan by hand and check to see if the piston assembly slides smoothly. A new piston assembly will be fit snugly at first but will loosen with use. Replace the end plate and retaining screws.

DAILY FUNCTIONAL CHECKLIST AND MAINTENANCE SCHEDULE

Daily Function Checklist	
Air Tank Pressure:	75-100 psi
Vacuum System Pressure:	45 psi
Delivery System Pressure:	58 psi
Water System Pressure:	30 psi
High Speed Handpiece:	Set to manufacturer's specifications (optional)
Low Speed Handpiece:	Set to manufacturer's specifications (optional)
Scaler	Set to manufacturer's specifications (optional)
Fiber Optic System:	Handpieces Illuminate when operated (optional)

Maintenance Schedule	Frequency
Purge Moisture from Air Storage Tank	Twice Daily (more often if humid)
Thoroughly Clean and Disinfect Unit/Vacuum System	Daily
Flush Handpieces (15 seconds)	Between Patients
Check Compressor Air Intake Filter for Cleaning or Replacement	Every 250 hours of operation or more frequently under dusty conditions
Check Compressor Efficiency for Replacement of Teflon Components and O-ring	Every 250 hours of operation
Check Air Regulator Filters	Every 1000 hours of operation
Check Water Filter	Every 500 hours of operation
Examine all tubings, gaskets and o-rings for any wear and loss of sealing	Annually or 2,000 hours of operation
Examine electrical wiring, transformers, switches and lighting system	Annually
Examine Cases for damage, cracking and operation of pressure relief valve (optional)	Annually

SECTION VI

TROUBLESHOOTING

6.1 BASIC TROUBLESHOOTING GUIDE.

The following information is not intended to isolate every problem that could arise with the Field Unit. It is, however, designed to help you quickly identify the problems that can be repaired without any special equipment or training.

If the Field Unit is maintained and given proper care, it will provide reliable service. If something does go wrong, the information contained herein tells you what can be done prior to physically removing the unit for extensive repair.

If the information does not identify and correct the problem, more detailed information is available in the sections covering the individual components.

Problem	Possible Cause	Correction
Compressor Module:		
Air Leaks	Hose fitting loose.	Tighten fitting.
Compressor is not delivering enough air	Piston and sleeve may be worn.	Replace piston and sleeve (refer to Maintenance).
	Restricted air intake filter.	Clean or replace the air intake filter (refer Maintenance).
	Hole in hose.	Replace the hose assembly.
	Air Leaks.	Tighten fittings. Reapply teflon tape i necessary.
Restricted Air Intake	Dirty air filter.	Clean or replace with new filter (refer to Maintenance).
Compressor will not start	On/Off switch is off. Cord is not plugged in securely.	Secure Cord.
Motor will not run	Motor overload protection switch has tripped.	Let motor cool off and the compressor wi automatically re-start.
	Fuse blown, circuit breaker tripped.	1. Check fuse box for blown fuse and repla as necessary. Reset circuit breaker. Do not us a fuse or circuit breaker with higher rating th that specified for your particular branch circu

Problem	Possible Cause	Correction
	Fuse blown, circuit breaker tripped (cont.)	2. Check for proper fuse. You should be using a Time Delay fuse.
		3. Check for low voltage problem.
		4. Check the extension cord. Replace if faulty.
		5. Disconnect other electrical appliances from circuit or operate the compressor on its own branch circuit.
	Loose electrical connections.	Disconnect power supply. Check wiring connections inside case.
	Possible defective capacitor(s).	Check capacitor.
	Faulty motor.	Have a motor shop check, replace if faulty.
Delivery Module:		
Audible air leak from inside the control panel	Loose fitting or tubing.	Remove unit from case. To help find leakage, apply a soapy solution to connections. When leak is found, tighten or replace leaking components.
Water leakage from within control panel	Loose fitting.	Apply water pressure, complete a visual check for leak. Tighten or replace leaking component.
Air bubbles in the coolant water and syringe water flow	Low water level in container.	Refill container.
Reduced or no flow of air or water	Loose fitting.	Check all water fastener connections and tighten if necessary.
	Blocked or pinched tubing.	Make sure tubing is not pinched. If tubes are not pinched, inspect for blockage.
Two or more handpieces run when only one should	O-ring in handpiece holder valve switch may be defective, allowing air through.	Replace O-ring.
Main air gauge indicator shows 100 psi but there is no air to unit	Air filter/regulator is not open.	Insure regulator is open and set to 58 psi.

Problem	Possible Cause	Correction
Water to 3-way syringe but there is not water to the scaler or high speed	Needle valve off or pinched water line.	Insure water switch on console is in "O position.
Control Unit:		
Water leaks from handpiece when switch is on, but handpiece is not in use	Defective O-ring in water relay.	Remove cartridge valve stem from water relay. Inspect O-ring. Clean and replace if necessa
Handpieces:		
Low pressure to handpieces	Air adjustment screws on tri-block are closed or adjusted to low.	Check tank air pressure gauge. Insure 100 ± 5 psi prior to adjusting handpiece block. Tu adjustment screws (recessed in consol counterclockwise to increase pressure.
Neither of the handpieces work (no air or water)	Pinched or crimped foot control tubing.	Check tubing and remedy or replace tubing
	Air compressor not functioning or air supply tubing not connected.	Check operation of compressor system a tubing connection.
	No or low level of water in container.	Check and refill.
	Water supply toggle is in the off position.	Switch toggle.
No water coolant from either handpiece, but there is water from the syringe	Water switch on foot control turned off.	
Three Way Syringe:		
Valve Cartridge leaks water	Worn O-rings.	Replace O-rings or valve assembly.
Valve Cartridge button sticks.	a) Debris build up.	Clean module cavity and valve cartrid assembly.
	b) Worn valve spring.	Replace spring.
	c) O-rings.	Replace O-rings.

Problem	Possible Cause	Correction
Nozzle nut/tube connection leaks water/air	a) Loose connection.	Check Connections.
		Tighten nozzle nut.
Clogged nozzle tube	b) Worn O-rings.	Replace O-rings.
	Debris from delivery system tubing or sterilization deposits.	Run cleaning wire through nozzle tube and/or ultrasonically clean.
Spray mist occurs when depressing air valve immediately following water valve depression	Worn nozzle assembly O-rings.	Replace O-rings.
Evacuation System:		
Low Suction		
	Hose connections loose on container.	Check connections.
	Lid loose	Snap into place.
	Kinked suction tubings.	Check for possible kink.
	Hole in vacuum tubing.	Inspect each tube for leaks.
	Barb connections on tubing loose.	Tighten barbs into lid by turning clockwise.
	Clogged tubing on barbs.	Check for possible clogging. Clean tubings with a with wire with a dull edge.
	Screen in saliva ejector tip clogged.	Clean or replace screen.
	Air/Filter regulator filter is dirty.	Replace filter.
	Regulator is set to low.	Adjust to 38 psi.
No Vacuum	Vacuum generator is filled with moisture.	Take generator apart and dry.
	One of the vacuum hoses is not connected to container.	Check connections.
	Lid is not on container.	Snap onto container.
	Air compressor is not on.	Check compressor.
	Regulator is turned off.	Adjust regulator to 38 psi.
	Air supply line is blown off.	Reattach.

Problem	Possible Cause	Correction
Fiber Optic:		
No Light	Bulb loose.	Secure bulb into socket.
	Bulb burnt out.	Replace bulb.
	Power supply cord loose.	Push firmly into receptacle.
	Faulty air signal to lamp control.	Check air signal tubing connection on lamp control box.
	Loose wiring.	Check wires connected into lamp control box, transformer, and handpiece tubing. If a loose wire is found, refer to wiring schematic and manufacturer's repair diagrams.

MODEL 2100M FIELD UNIT - DENTAL
MAINTENANCE AND STORAGE INSPECTION RECORD

Procedure	Date	Inspector	Date	Inspector	Date	Inspector	Date	Inspector	Date	Inspector
Compressor Air Intake Filter										
Compressor Efficiency										
Air Regulator Filters										
Water Filter										
Tubings, Gaskets, O-Rings										
Electrical Wiring, Transformers,										
Switches, Lighting System										
Cases: Damage, Cracking, etc.										

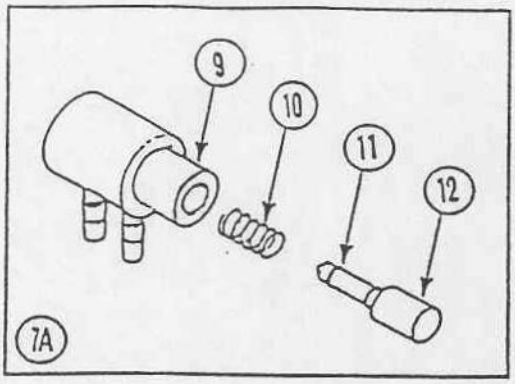
MODEL 2100M FIELD UNIT - DENTAL
MAINTENANCE AND STORAGE INSPECTION RECORD

Procedure	Date	Inspector	Date	Inspector	Date	Inspector	Date	Inspector	Date	Inspector

MODEL 2100M FIELD UNIT - DENTAL
MAINTENANCE AND STORAGE INSPECTION RECORD

Procedure	Date	Inspector	Date	Inspector	Date	Inspector	Date	Inspector	Date	Inspector

ILLUSTRATIONS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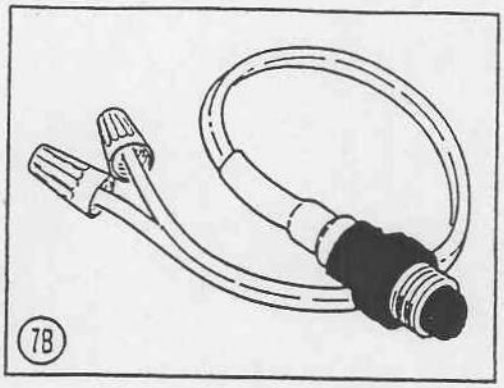
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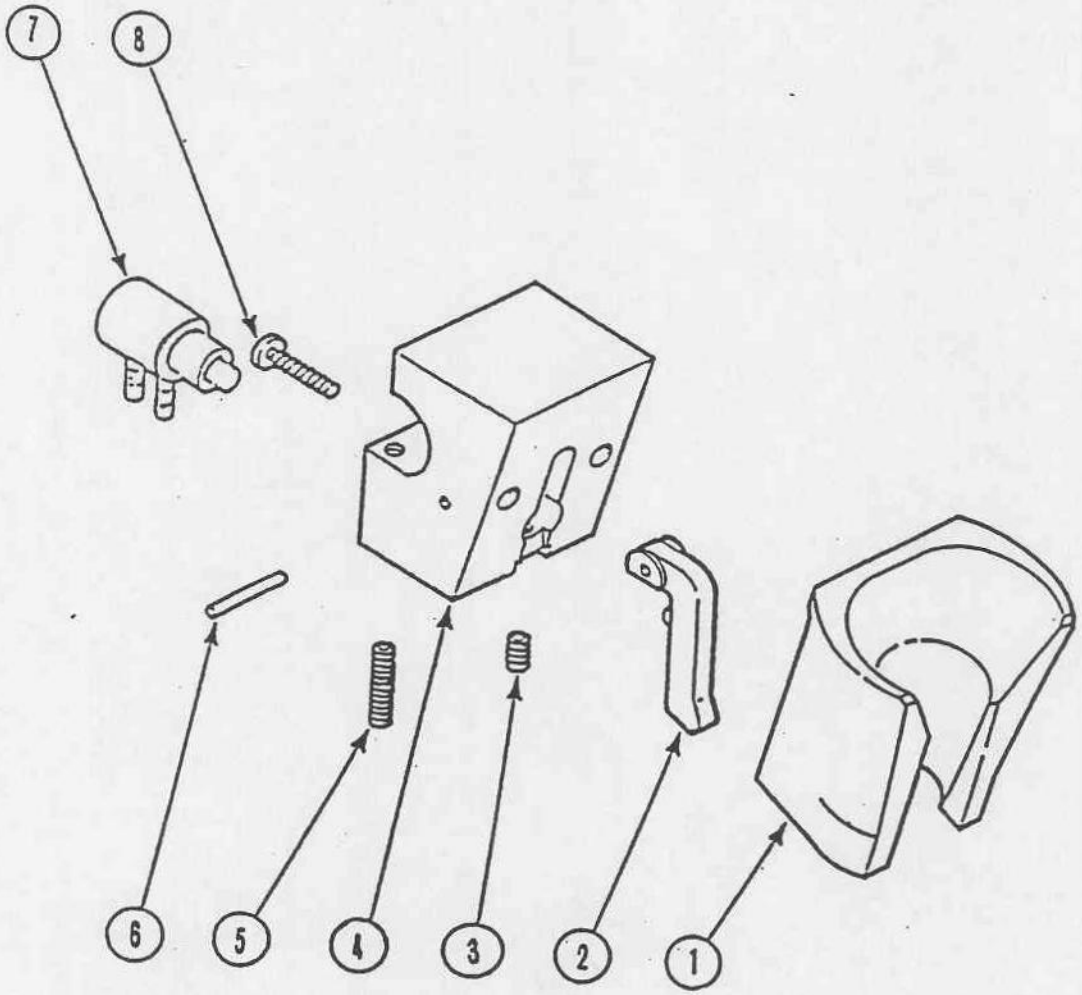
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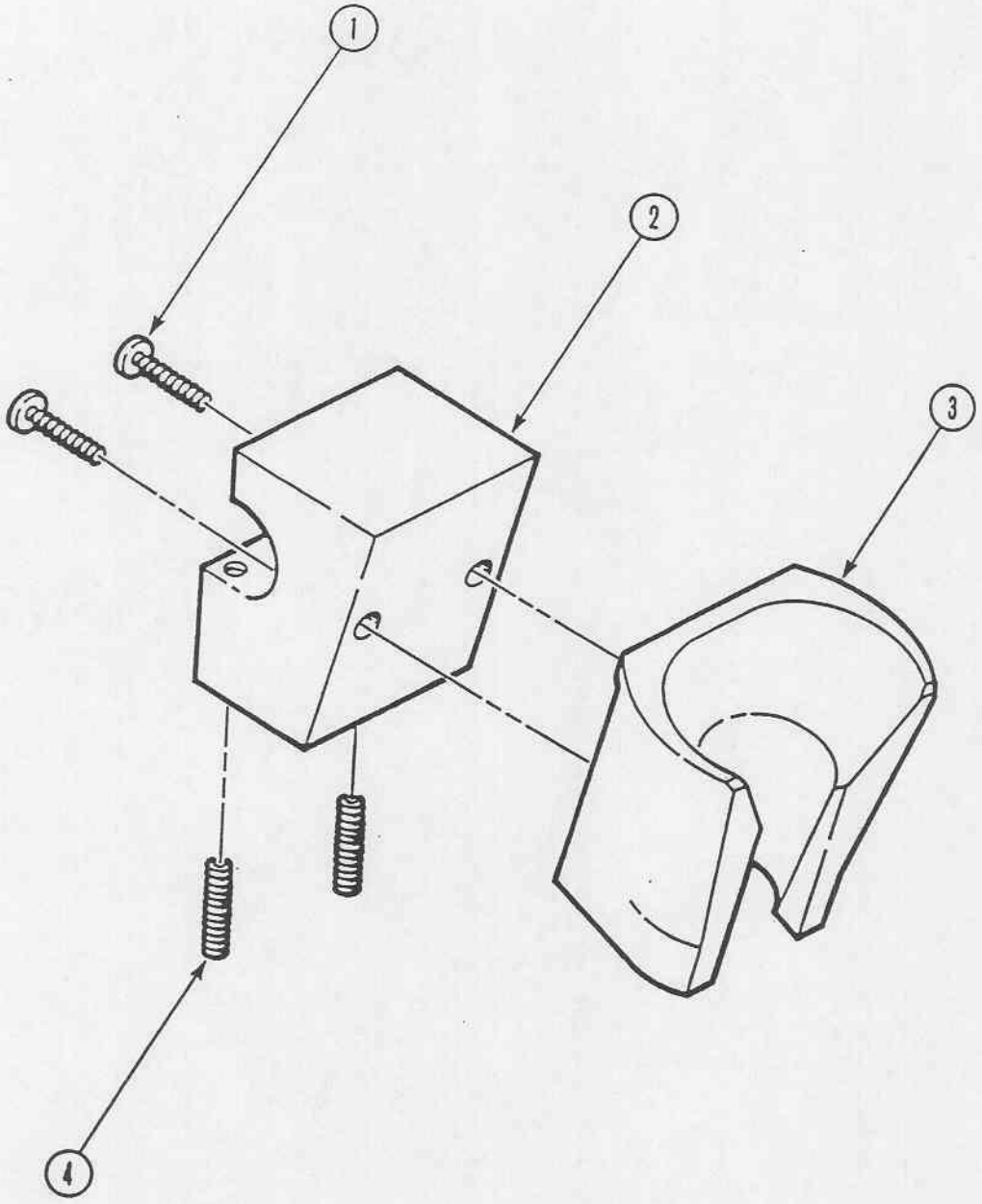
AUTOMATIC HANDPIECE HOLDER

30-0003

Ref. No.	Description	Part No.	Qty.
	Normally Opened (Air Activated)		
1	Holder	90-6550	1
2	Pivot Link*		1
3	Set Screw, 6-32 x 3/16"*		1
4	Adaptor		1
5	Set Screw, 6-32 x 1/2"		2
6	Pin .061 x 1/2"		
7	Pilot Valve Assembly	90-8057	1
8	Screw, 4 x 1/2" Polyfast*		2
9	Valve Body*		1
10	Spring*		1
11	O-Ring*		1
12	Stem*		1
*	Automatic Handpiece Holder Hardware Kit	90-8050	
	Normally Closed (Electric Activated)		
1	Holder	90-6550	1
2	Pivot Link*		1
3	Set Screw, 6-32 x 3/16"*		1
4	Adaptor		1
5	Set Screw, 6-32 x 1/2"*		1
6	Pin, .061 x 1/2"*		2
7B	Switch, Electric Activation	20-6009	1
8	Screw, 4 x 1/2" Polyfast*		2
*	Automatic Handpiece Holder Hardware Kit	90-8051	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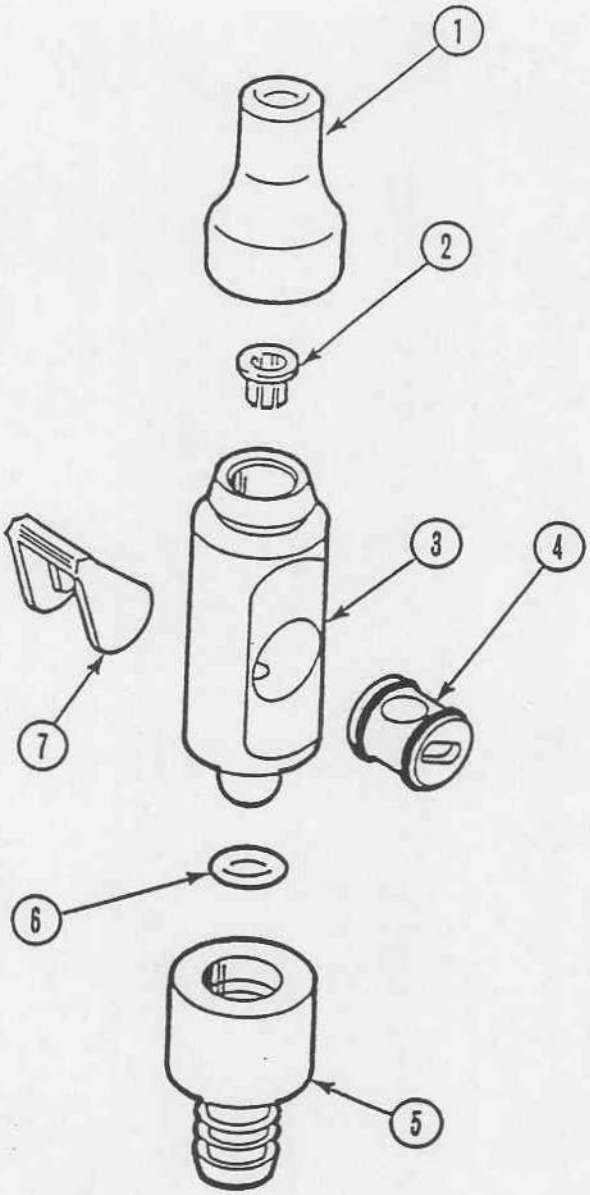
UNIVERSAL HOLDER

30-0005

Ref. No.	Description	Part No.	Qty.
1	Screw, 4 x 1/2" Polyfast		2
2	Adaptor		1
3	Holder		1
4	Set Screw, 6-32 x 1/2"	13-2089	2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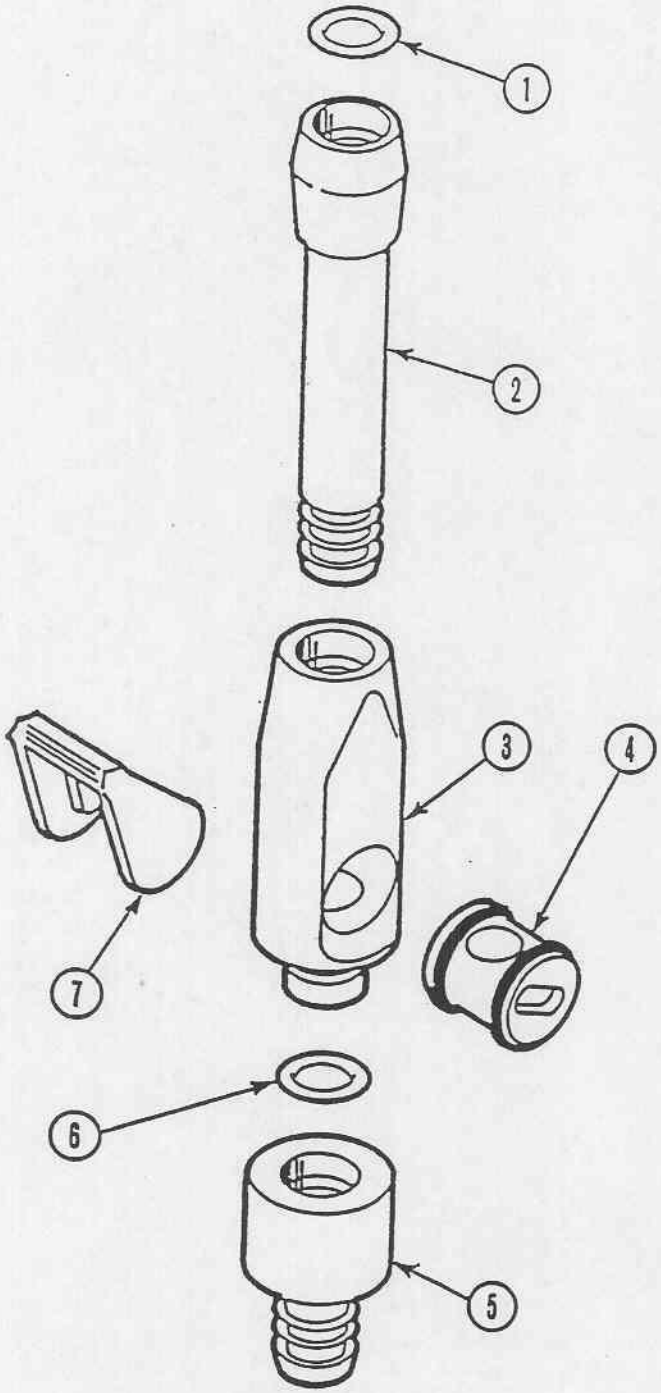
SALIVA EJECTOR TIP

30-0050

Ref. No.	Description	Part No.	Qty.
1	Saliva Ejector Tip	30-0051	1
2	Screen*		1
3	Valve Body		
4	Spool		
5	Quick Disconnect		
6	O-Ring* **	13-0056	2
7	Lever*		1
*	Screen, Saliva Ejector Kit (Pkg. 100)	90-9220	
**	Repair Kit (includes 5 O-Rings)	90-8080	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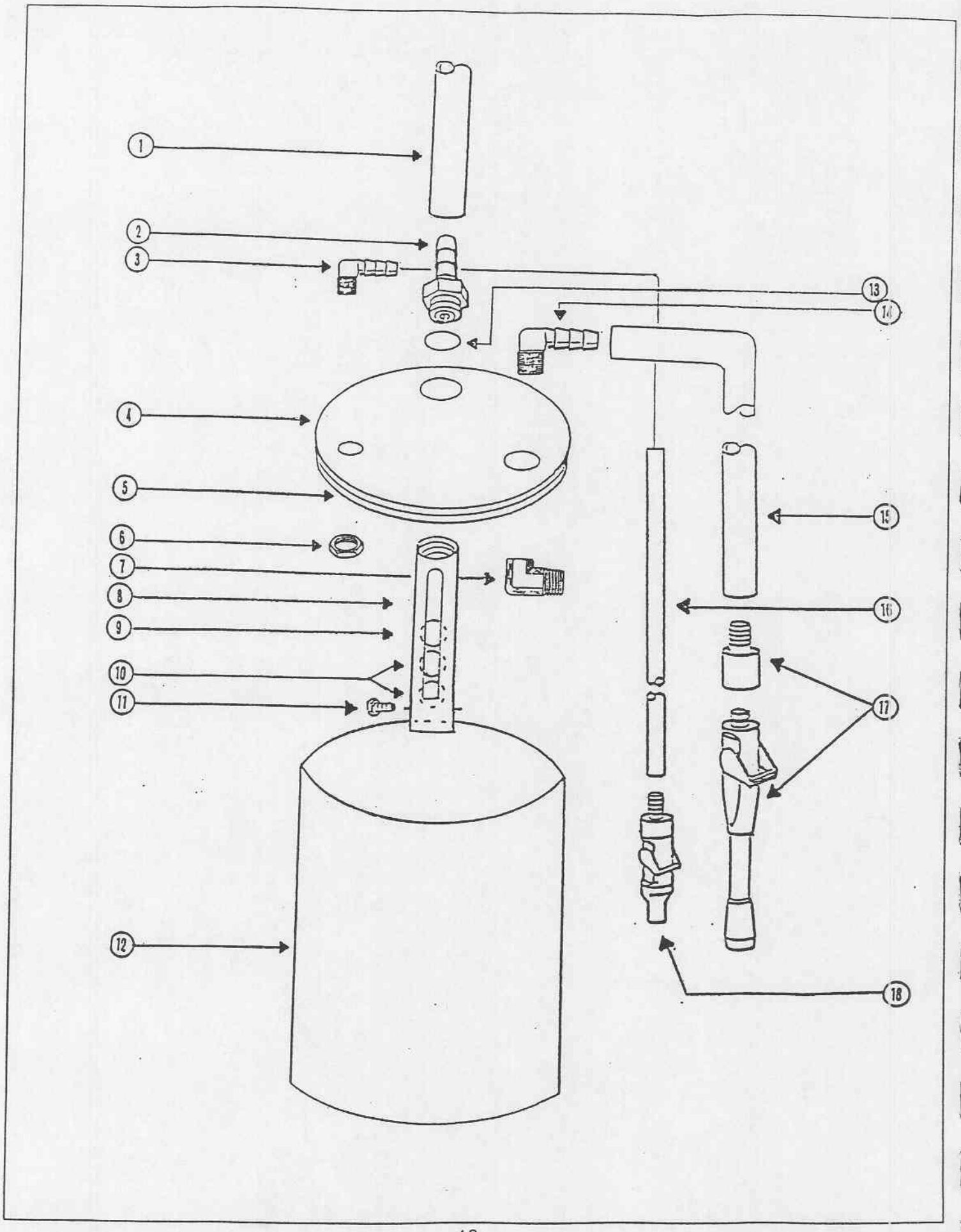
CENTRAL VACUUM LEVER VALVE

30-0060

Ref. No.	Description	Part No.	Qty.
1	O-Ring, Tip Adaptor	13-0350	3
2	Universal Tip Adaptor		1
3	Valve Body		1
4	Spool		1
5	Quick Disconnect		1
6	O-Ring, Quick Disconnect	13-0355	1
7	Lever	90-6525	1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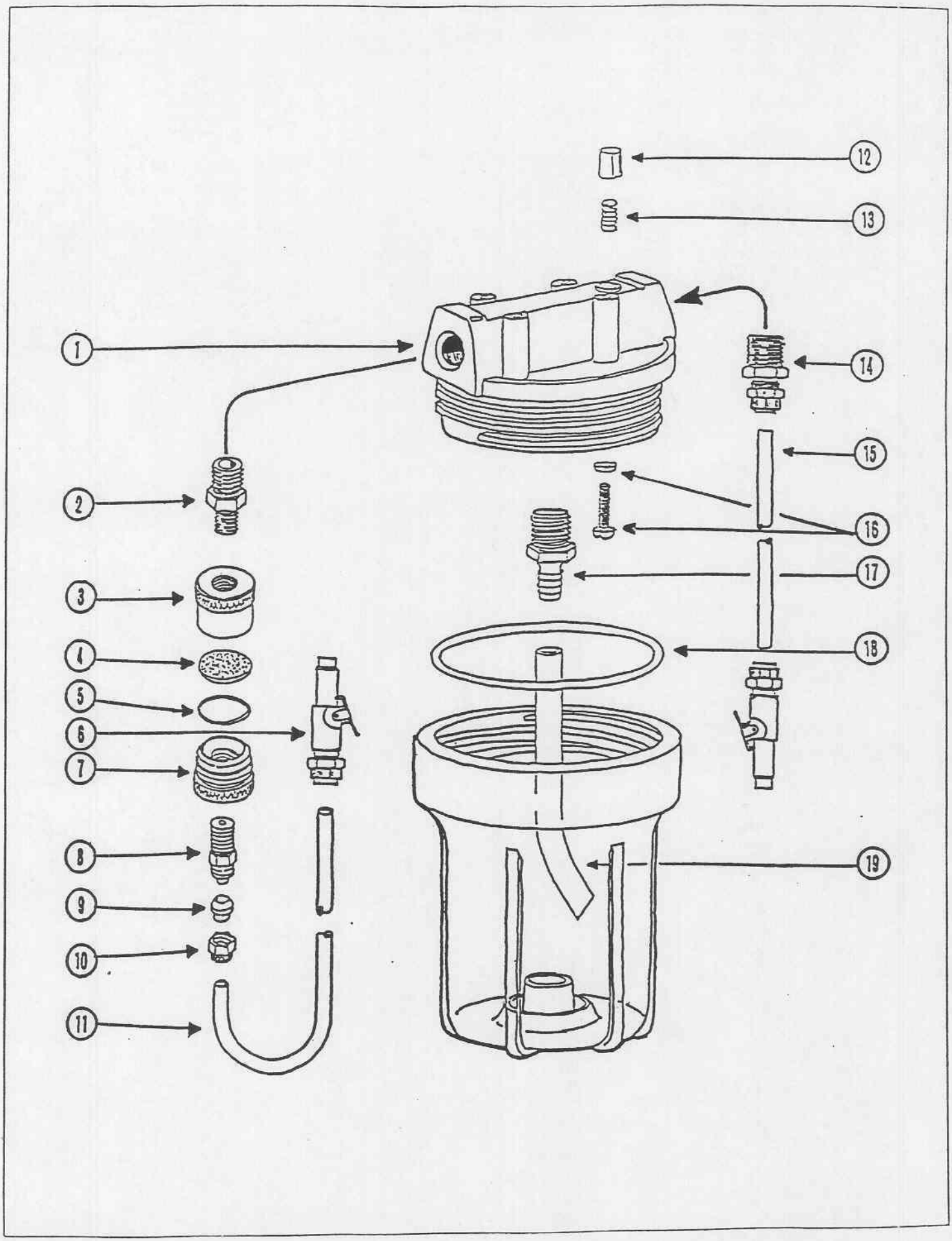
VACUUM CANISTER ASSEMBLY

Ref. No.	Description	Part No.	Qty.
1	Tube, 5/8" ID Corragated	31-0312	1
2	Barb, 5/8" x 1/2" MPT Nylon	33-2186	1
3	Barb 1/4", Elbow 1/4" MPT Nylon	33-2078	1
4	Lid, Vacuum Canister*	90-6225	1
5	Plate, Aluminum	05-1300	1
6	Nut, 1/4" MPT Nylon	13-1210	1
7	Elbow, 1/2" MPT x 1/2" MPT Nylon	33-2084	1
8	Float Tube	07-0592	1
9	Ball, 3/4" Aluminum	15-5210	1
10	Ball, 20 mm Plastic	15-5215	1
11	Screw, Stainless Steel 8-32 x 3/4", Allen	13-1926	2
12	Vacuum Canister*	30-3210	1
13	O-Ring	13-0370	1
14	Elbow, 1/2" Barb x 1/2" MPT, Nylon	33-2085	1
15	Tube, 1/2" Corragated Asepsis	31-0305	6 ft.
16	Tubing, 3/8" Saliva Ejector	31-0200	6 ft.
17	H.V.E. Valve with Lever, Autoclavable	30-0060	1
18	Saliva Ejector Valve with Lever, Autoclavable	30-3210	1
*	Vacuum Canister Assembly Kit	30-3210	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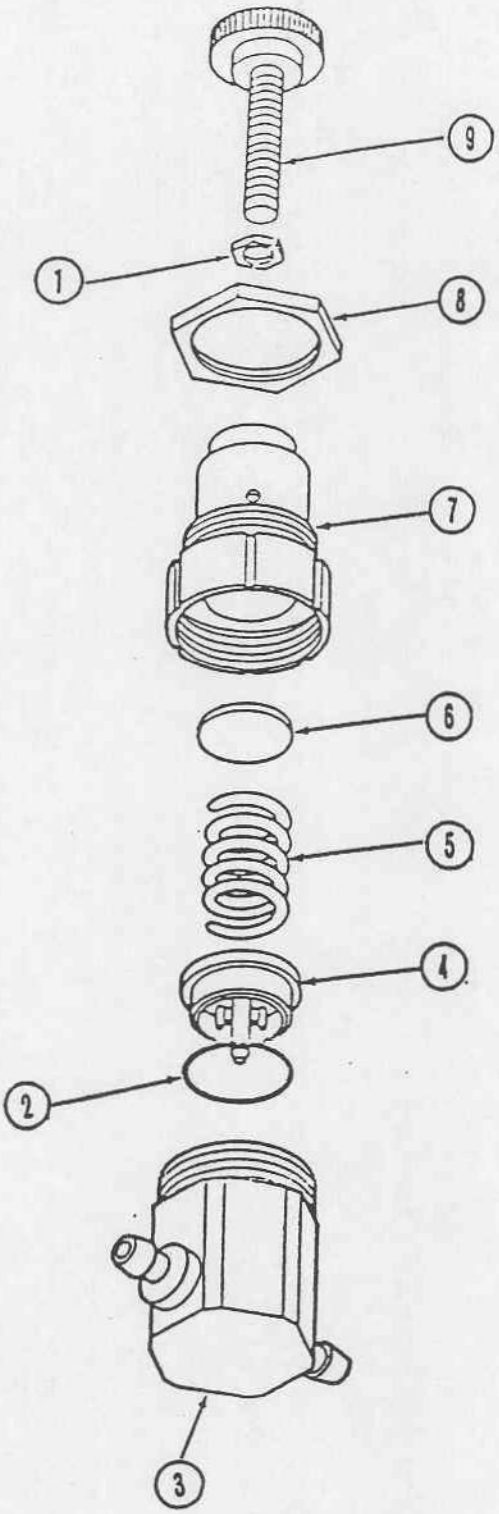
WATER CONTAINER ASSEMBLY

Ref. No.	Description	Part No.	Qty.
1	Cap, Water Container**		1
2	Adapter, 1/4" MPT x 1/8" MPt	33-2125	1
3	Filter, Female Body*		1
4	Filter Disc*	30-2061	1
5	Filter, O-Ring*		1
6	Male insert 1/4" With Shut Off	30-1020	1
7	Filter, Male Body*		1
8	Poly Flow Connector, 1/8" MPT x 1/4" Poly	33-1106	1
9	Poly Sleeve, 1/4"***		1
10	Nut, 1/4"***		1
11	Tube, 1/4" Blue	31-0100	1
12	Pressure Release Button**		1
13	Spring**		1
14	Connector, Poly 1/4" x 1/4" MPT	33-1110	1
15	Tube, 1/4" Red	31-0101	1
16	Screw and 1/8" Washer**		1
17	Barb, 3/8" x 1/2" MPT	33-2155	1
18	O-Ring, Water Container**	13-0399	1
19	Tube, 3/8" Gray	31-0210	1
*	Filter Assembly	30-2060	
**	Water Container	30-3000	
***	Nut and Poly Sleeve 1/4"	33-0150	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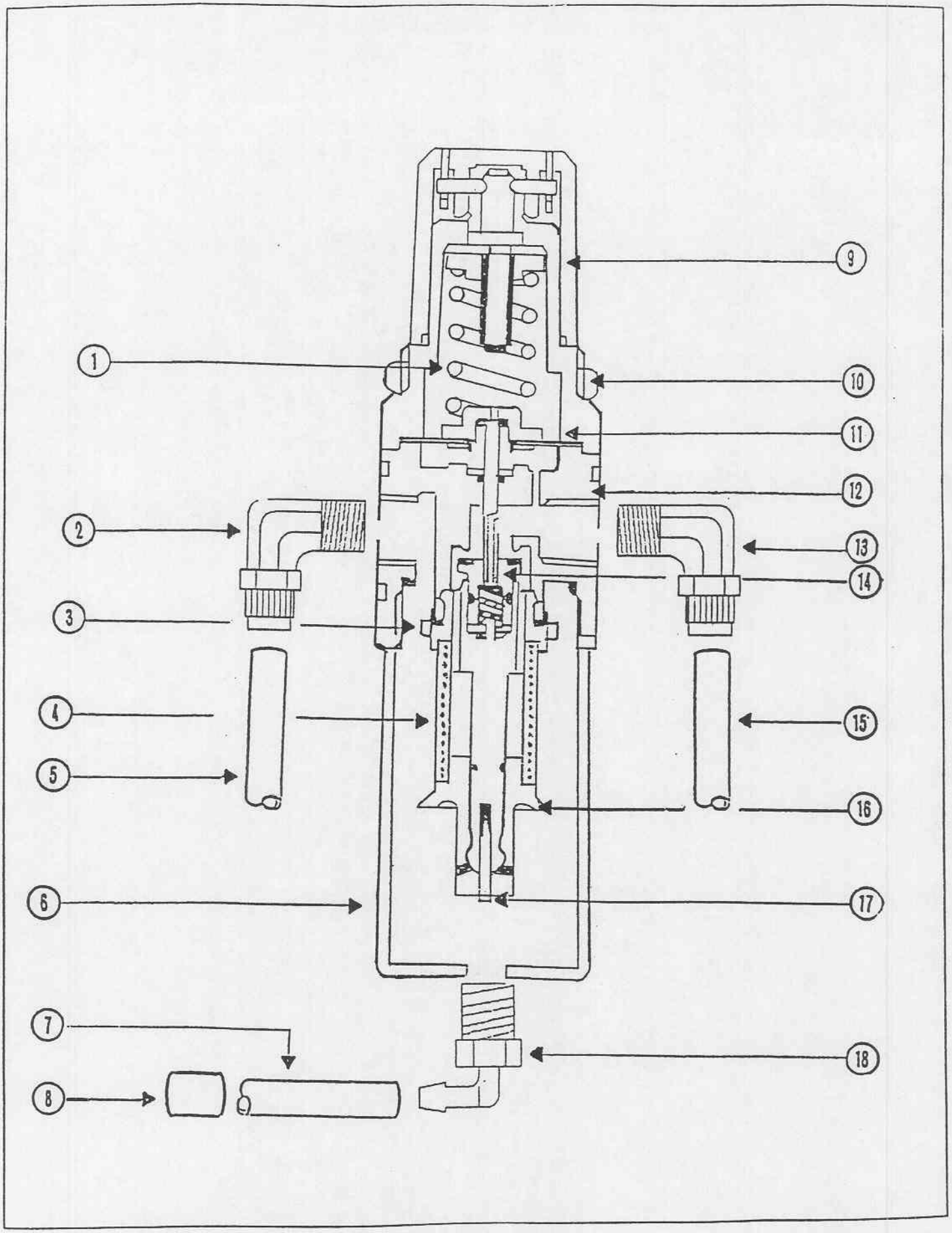
Ref. No.	Description	Part No.	Qty.
1	Lock Nut		1
2	O-Ring	13-0395	1
3	Body and Valve Assembly		1
4	Piston		1
5	Regulating Spring		1
6	Spring Rest		1
7	Bonnet		1
8	Panel Mount Nut		1
9	Adjusting Screw		1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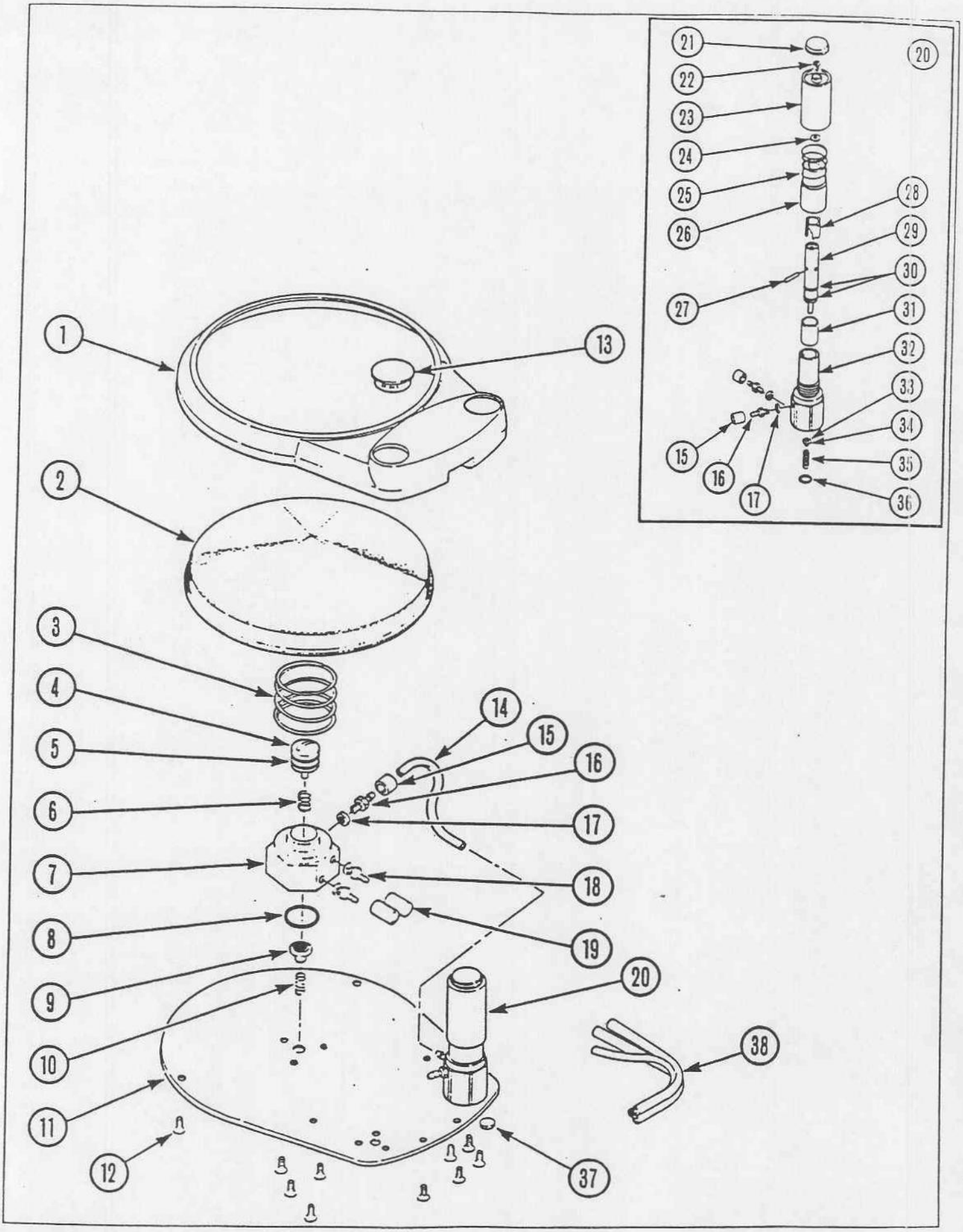
AIR FILTER/REGULATOR

90-9225

Ref. No.	Description	Part No.	Qty.
1	Spring, Pressure Adjustment*		1
2	Elbow, 1/4" Poly x 1/8" MPT	33-1060	1
3	Deflector*		1
4	Filter Element*	30-2001	1
5	Tubing, 1/4" Gray	31-0110	1
6	Bowl		1
7	Tubing 1/4" red	31-0101	1
8	Ferrale 1/4"	33-1605	1
9	Knob*		1
10	Panel Nut*		1
11	Diaphragm*	13-0385	1
12	Body*		1
13	Elbow, 1/4" Poly x 1/8" MPT	33-1060	1
14	Valve*		1
15	Tubing, 1/4" Gray	31-0110	1
16	Baffle Plate*		1
17	Pin*	13-2735	1
18	Elbow, 1/8" Barb x 1/8" MPT	33-2141	1
*	Filter/Regulator	30-2000	1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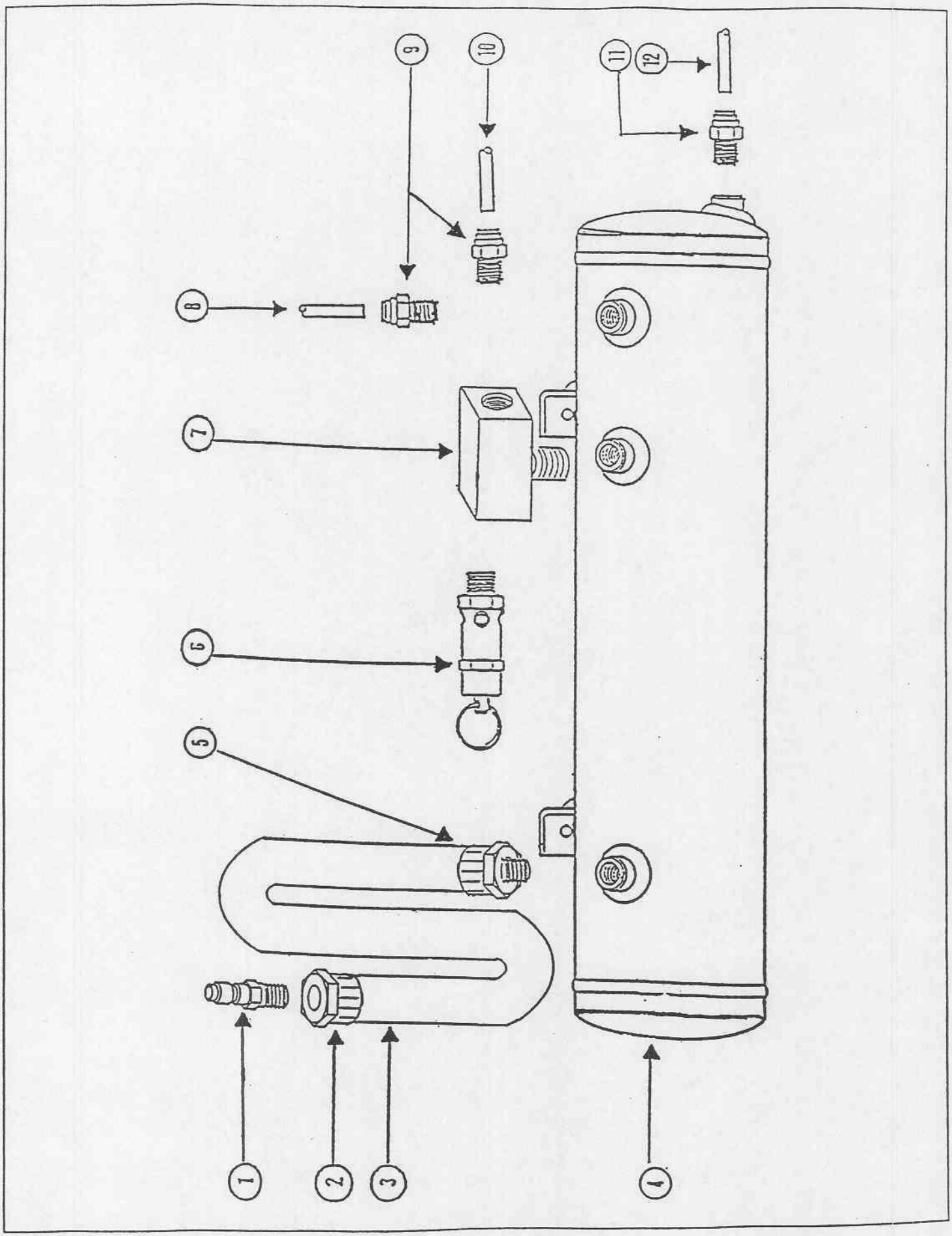
FOOT CONTROL (wet/dry valve) 30-0180

Ref. No.	Description	Part No.	Qty.
1	Cover Retainer Gray	90-6592	1
2	Cover		1
3	Spring*		1
4	Plunger*		1
5	O-Ring*		2
6	Spring*		1
7	Valve Body		1
8	O-Ring*		1
9	Poppet Seal*		1
10	Spring*		1
11	Base Gray		1
12	Screw, 4-40 x 5/16" Nylock* **		13
13	Hole Plug, Plastic Gray	90-6595	1
14	Interconnect Tube, Clear 1/8"	31-0010	1
15	Barb Ferrule, Small	33-1600	4
16	Barb Fitting, 1/16" x 10-32	33-1500	3
17	Plastic Washer	13-1580	6
18	Barb Fitting, 1/8" x 10-32	33-1505	2
19	Barb Ferrule, Large	33-1605	4
20	Water On/Off, Toe Touch Valve Assembly	90-8113	1
21	Cap Insert, Plastic**		1
22	Screw, 4-40 x 1/4"		1
23	Plunger Cover		1
24	Lock Washer**		1
25	Spring**		1
26	Guide Retainer		1
27	Keeper Pin		1
28	Plunger Guide**		1
29	Plunger, Water Control**		1
30	O-Ring**		2
31	Guide Sleeve**		1
32	Valve Body, Water Control		1
33	O-Ring**		1
34	Poppet Seal**		1
35	Spring		1
36	O-Ring**		1
37	Rubber Foot	90-6590	7
38	Foot Control Tubing, 4 hole Gray Vinyl	31-0410	7
*	Drive Air Valve Repair Kit	90-8110	
**	Water Control Valve Repair Kit	90-8115	
***	Wet/Dry Kit	90-8118	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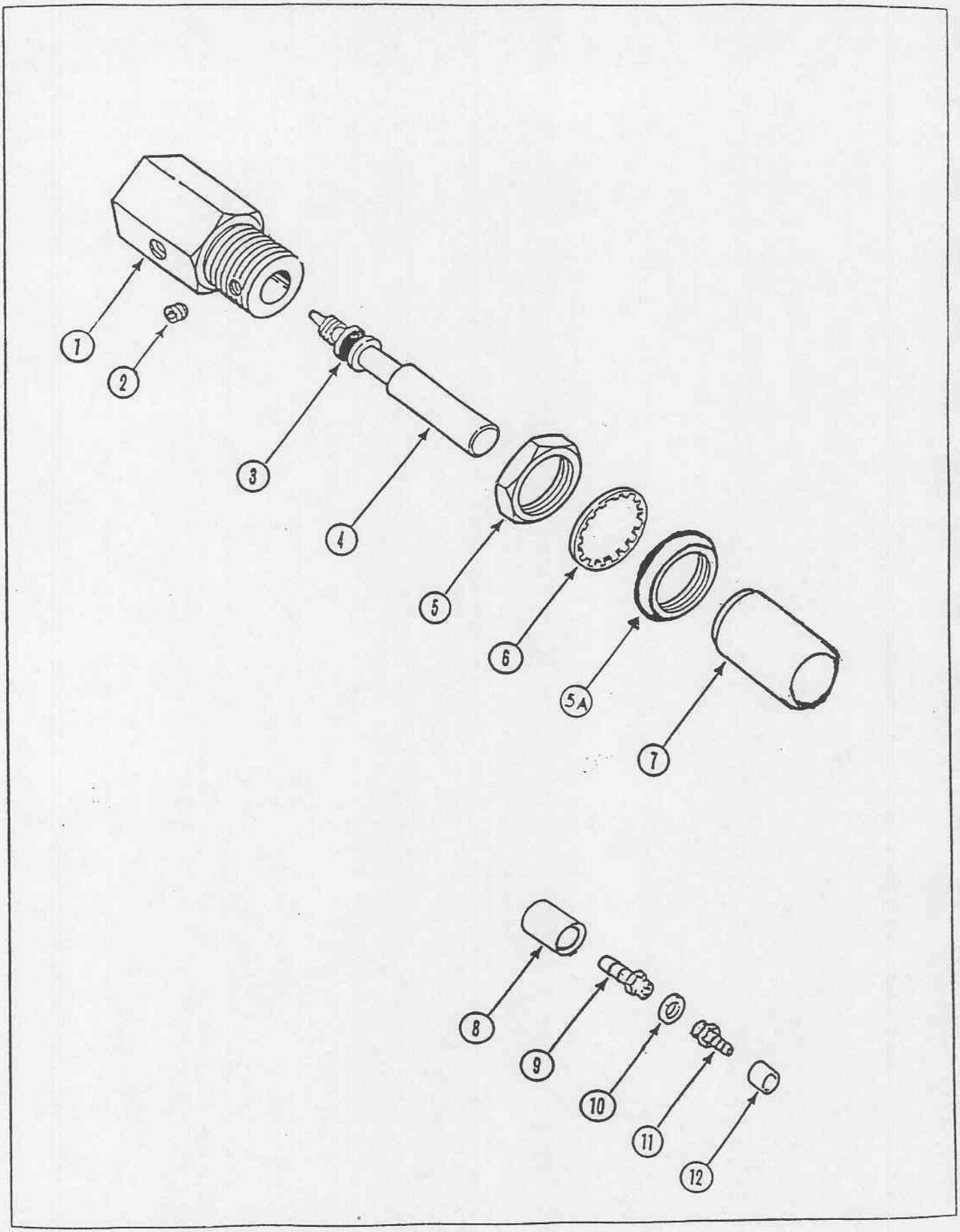
AIR TANK ASSEMBLY

Ref. No.	Description	Part No.	Qty.
1	3/8" Nipple Couple 3/8" body x 3/8" MPT	33-1157	1
2	Hose Crimp Fitting, 3/8" FPT x 1/2" Barb Crimp*		1
3	Hose, Air 1/2" ID*	31-0302	1
4	Air Tank, Aluminum, 1 gallon	30-5105	1
5	Hose Crimp Fitting, 1/4" MPT x 1.2" Barb Crimp*		1
6	Pressure Relief Valve	30-2165	1
7	1/4" Male Branch TEE	33-1012	1
8	Tubing, 1/4" OD Gray	31-0110	1
9	Push-Loc 1/4" x 1/4" MPT	33-2105	1
10	Tubing, 1/4" OD Gray	31-0110	1
11	Push-Loc 1/4" x 1/4" MPT	33-2105	1
12	Tubing, 1/4" OD Red	31-0101	1
*	Hose Assembly	90-9126	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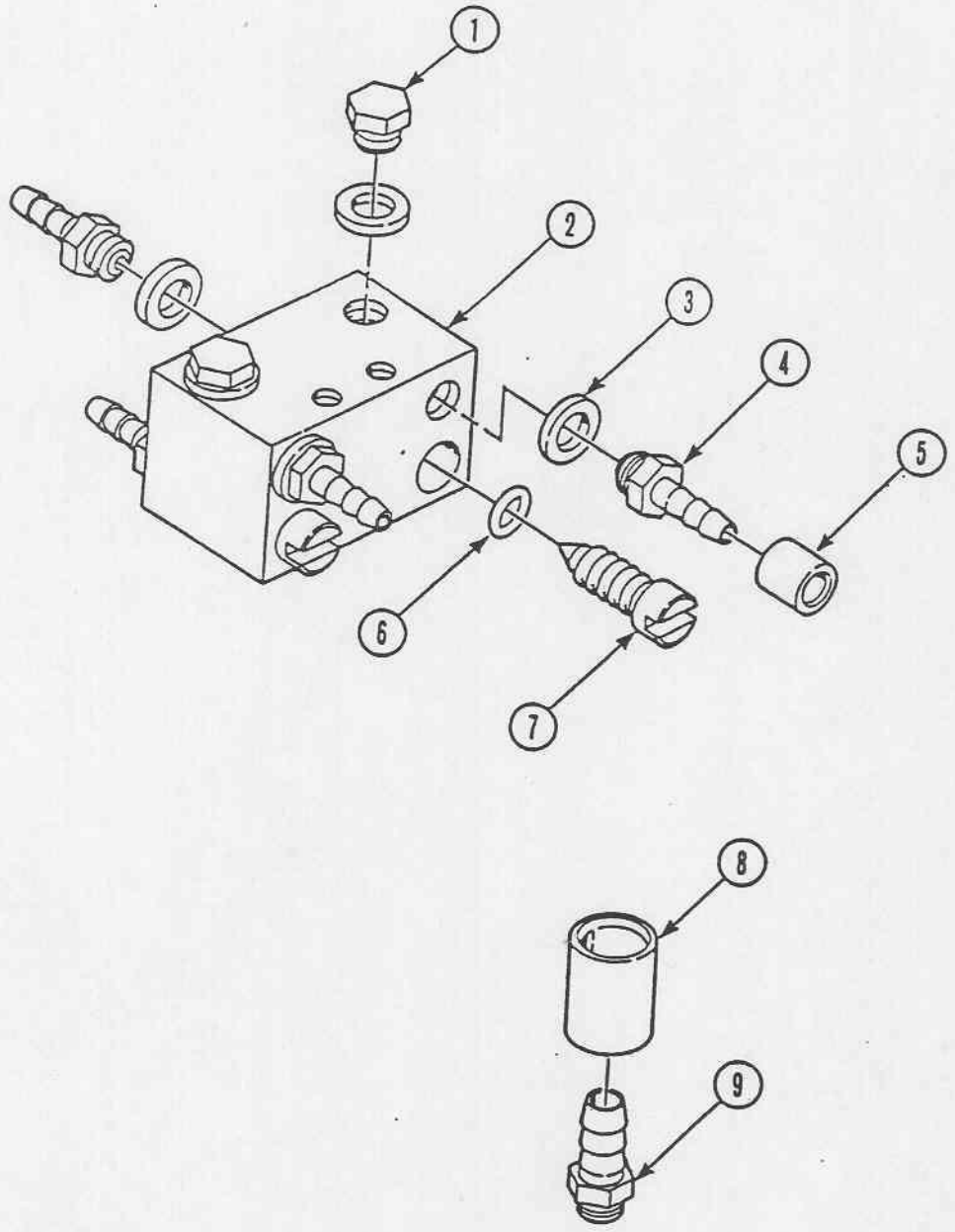
NEEDLE CONTROL VALVE

30-0200

Ref. No.	Description	Part No.	Qty.
1	Valve Housing		1
2	Set Screw, 6-32 x 1/8"*		1
3	O-Ring*		1
4	Stem With O-Ring*		1
5	Nut**		2
5A	Nut, Decorative Trim**	13-1300	1
6	Star Washer		1
7	Knob	13-6001	1
8	Barb Ferrule, Large	33-1605	1
9	Barb Fitting, 1/8" x 10-31	33-1505	1
10	Plastic Washer	13-1580	1
11	Barb Fitting, 1/16" x 10-32	33-1500	1
12	Barb Ferrule, Small	33-1600	1
*	Needle Control Valve Repair Kit	90-8150	
**	Each nut includes Star Washer		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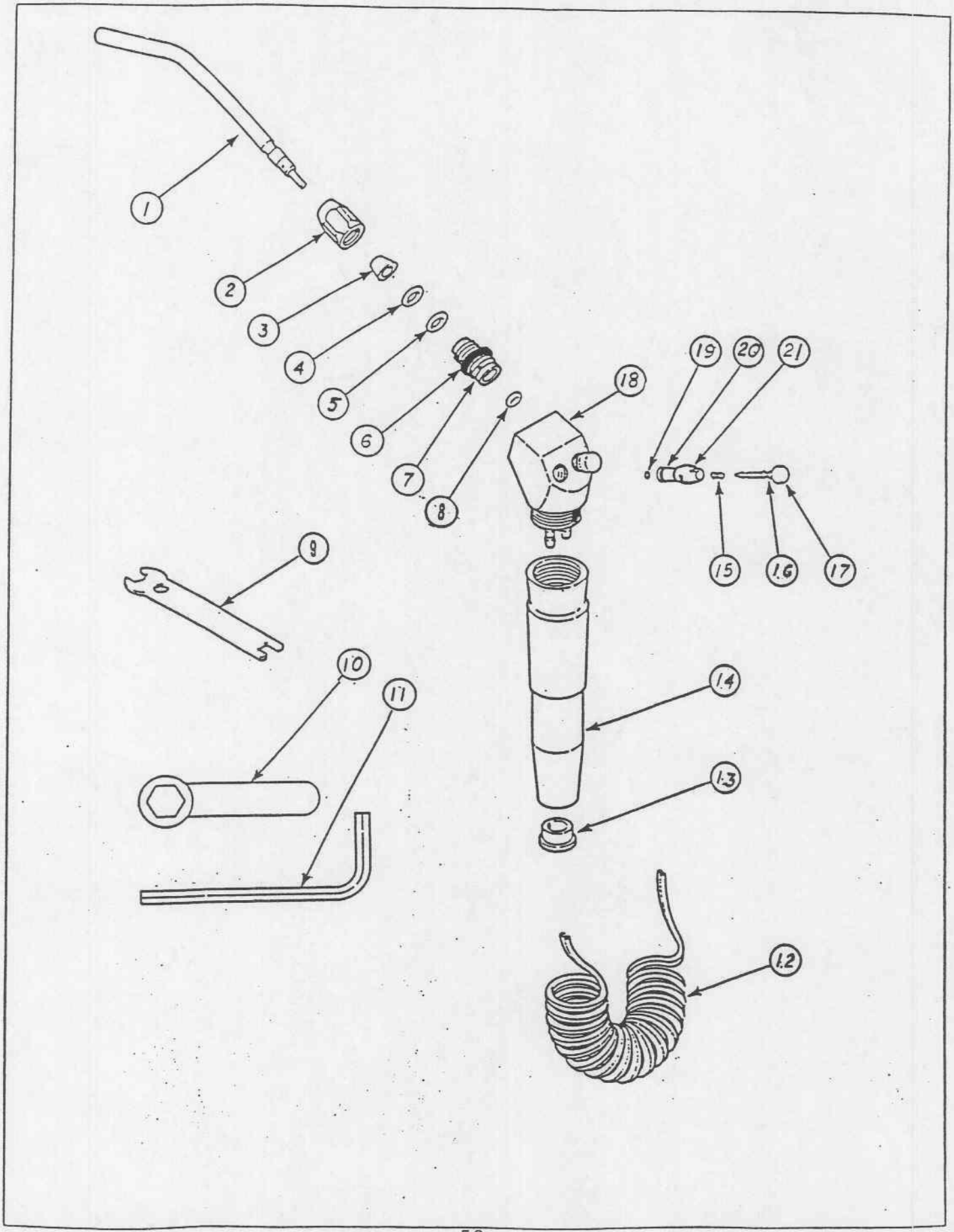
Ref. No.	Description	Part No.	Qty.
1	Plug, 10-32	13-2605	2
2	Body		1
3	Plastic Washer	13-1580	6
4	Barb Fitting, 1/16"	33-1901	4
5	Barb Ferrule, Small	33-1600	4
6	O-Ring		2
7	Needle		2
8	Barb Ferrule, Large (Optional)	33-1605	2
9	Barb Fitting, 1/8" (Optional)	33-1820	2
*	Repair Kit, Syringe Manifold	90-8007	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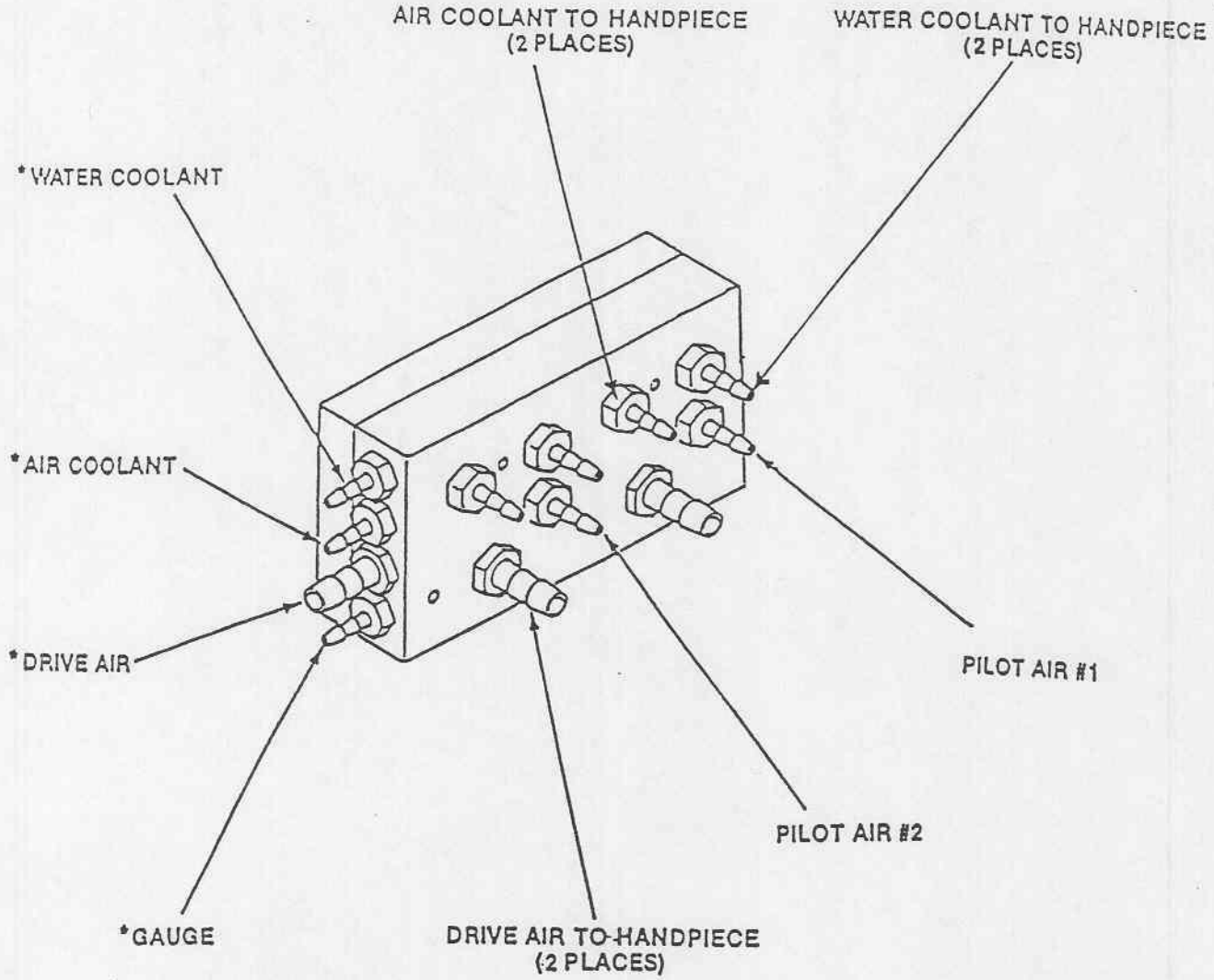
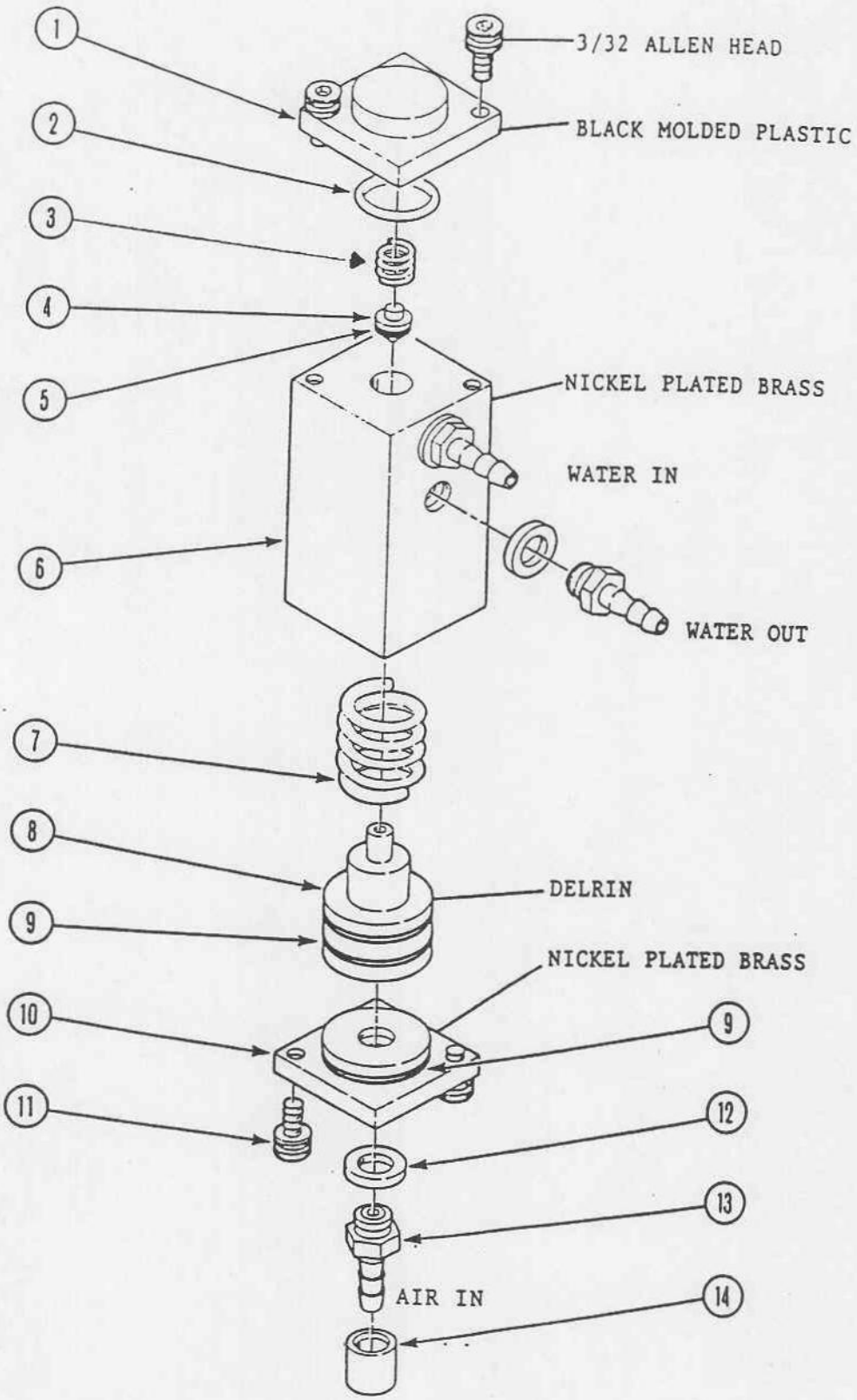
SYRINGE

30-0040

Ref. No.	Description	Part No.	Qty.
1	Syringe Tip, Autoclavable* (**)		1
2	Syringe Tip Nut**		1
3	Cone**		1
4	O-Ring**		1
5	O-Ring**		1
6	O-Ring**		1
7	Threaded Barrel**		1
8	O-Ring***		1
9	Sryinge Tool**		1
10	Wrench***		1
11	Hex Allen Wrench**		1
12	Sryinge Tubing		
	Straight: Black	31-0004	1
	Gray	31-0002	1
	Coiled: Black	31-0007	1
	Gray	31-0006	1
13	Cap	90-7310	1
14	Handle		1
15	Spring***		1
16	O-Ring***		1
17	Stem***		1
18	Syringe Head***		1
19	O-Ring***		1
20	O-Ring***		1
21	Body, Cartridge***		1
*	Syringe Tips, Autoclavable (Pkg. of 5)	90-9210	
**	Syringe Tip Kit	90-8001	
***	Sryinge Replacement Cartridge Kit	90-8005	


AIR COOLANT TO HANDPIECE
(2 PLACES)
WATER COOLANT TO HANDPIECE
(2 PLACES)
*WATER COOLANT
*AIR COOLANT
*DRIVE AIR
*GAUGE
DRIVE AIR TO HANDPIECE
(2 PLACES)
PILOT AIR #2
PILOT AIR #1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NICKEL PLATED BRASS
WATER IN
WATER OUT
DELRIN
NICKEL PLATED BRASS
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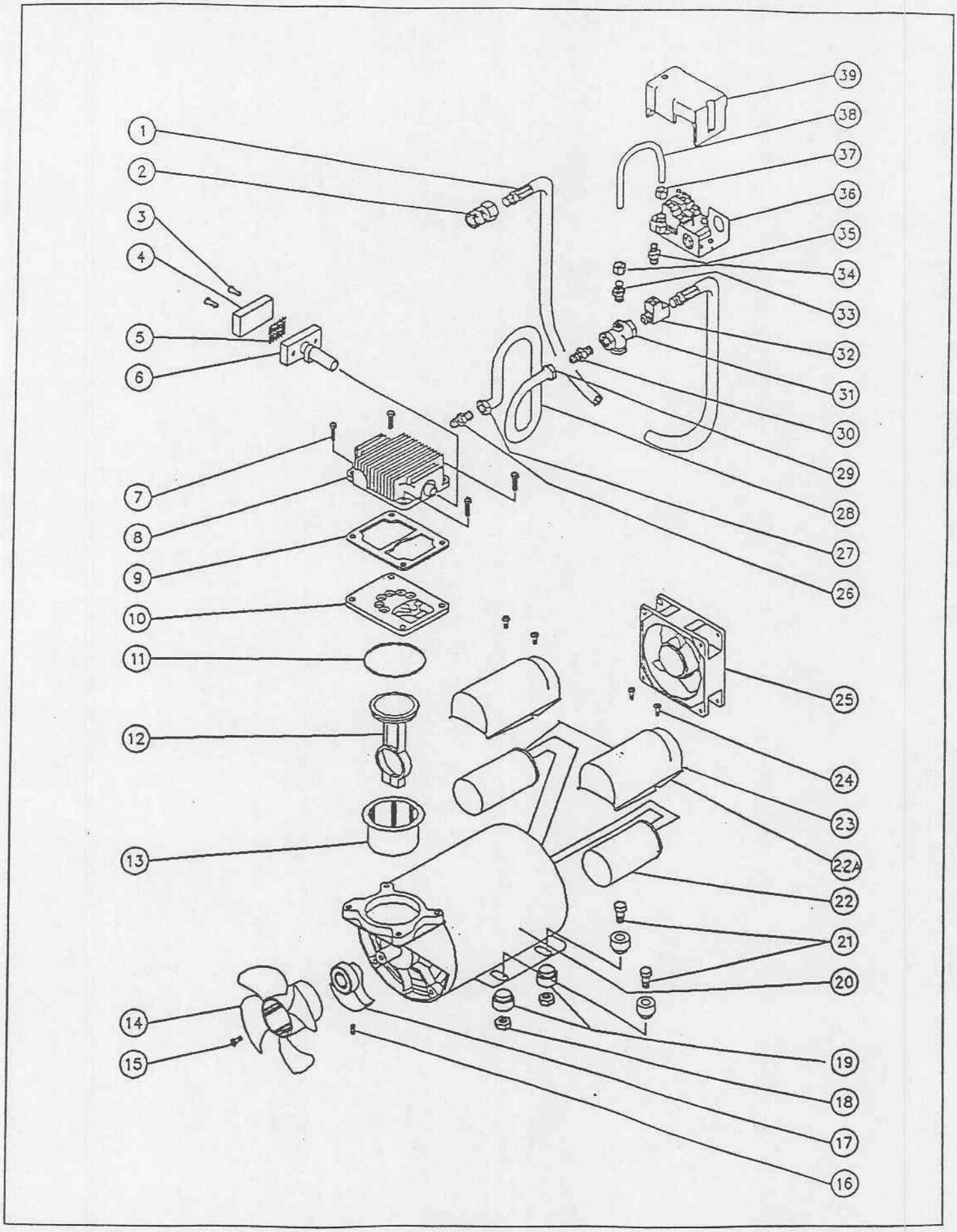
AIR IN

WATER RELAY VALVE

Ref. No.	Description	Part No.	Qty.
1	End Cap		1
2	O-Ring*		1
3	Spring (Poppet)*		1
4	Poppet*		1
5	O-Ring*		1
6	Valve Body		1
7	Spring (Plunger)*		1
8	Plunger*		1
9	O-Ring*		3
10	End Cap (Input)		1
11	Cap Screw, 4-40 x 1/4"*		4
12	Plastic Washer	13-1580	3
13	Barb Fitting, 1/16" x 10-32	33-1500	3
14	Barb Ferrule, Small	33-1600	3
*	Repair Kit (Water Relay Valve)	90-8180	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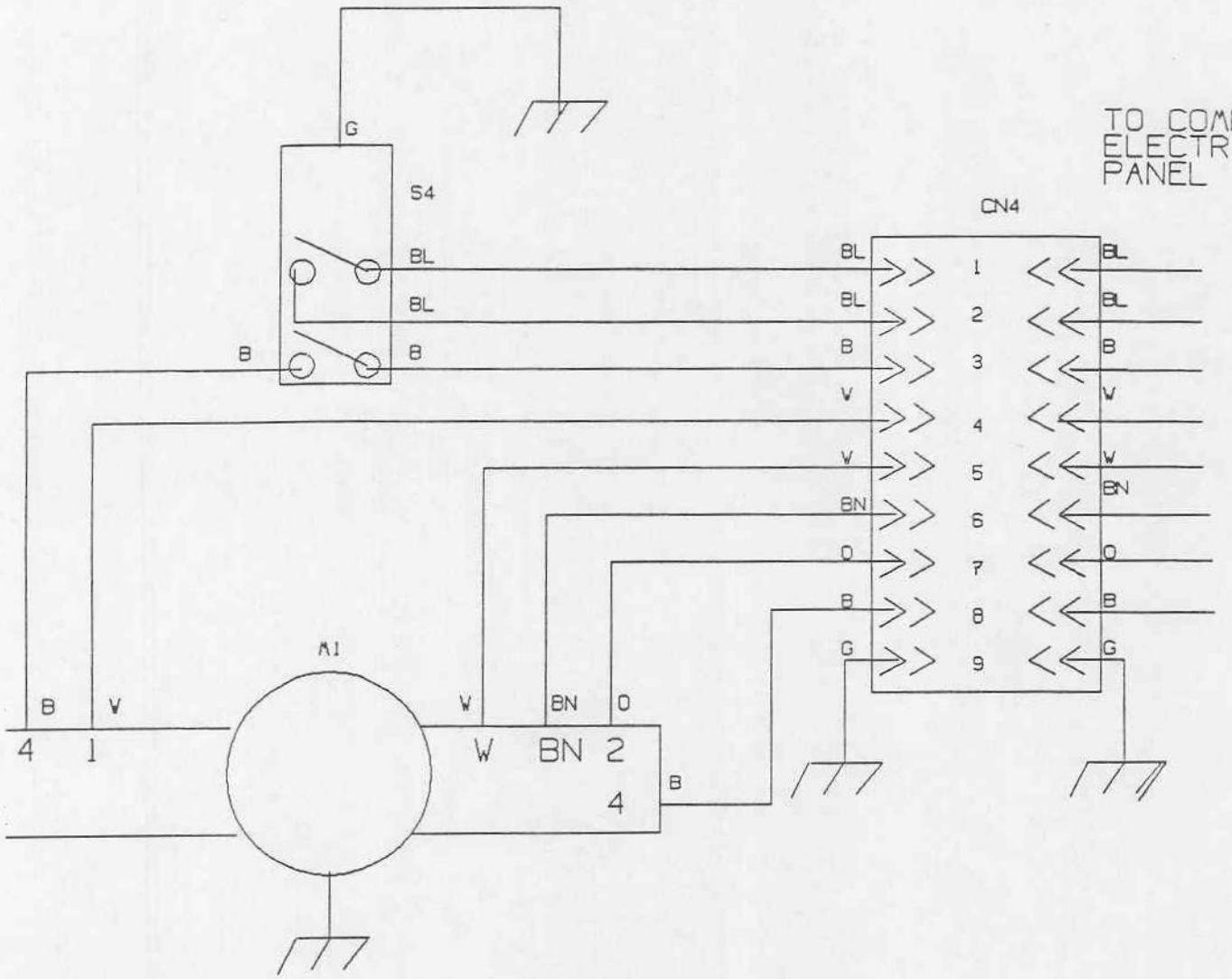
COMPRESSOR

Ref. No.	Description	Part No.	Qty.
1	Hose Assembly, 1/2" ID, 10 ft.	90-9125	1
2	Coupler 3/8" Body x 3/8" FPT	33-1033	1
3	Pins, Filter		2
4	Filter*	30-2065	1
5	Screen*		
6	Intake Muffler	09-1200	1
7	1/4"- 20 x 1 1/4" Bolt, hex head	13-2507	4
8	Head	09-1150	1
9	Gasket	13-0210	1
10	Valve Plate Assembly (includes valves restrictors screws)	07-4000	1
11	O-Ring*	13-0375	1
12	Connecting Rod Assembly*	09-1125	1
13	Cylinder Sleeve*	09-1310	1
14	Fan Blade	09-5110	1
15	Screw #10-24 x 3/8" Hex head	13-2425	1
16	Screw Set, 1/4"-20 x 3/8"	13-2096	1
17	Eccentric Assembly	07-4010	1
18	Nut 5/16"	13-1235	4
19	Isolators	09-1010	8
20	Motor	20-0100	1
21	Bolt 5/16" x 1 1/4", Hex Head	13-2508	4
22	Capacitor, Start	90-4510	1
22A	Capacitor, Run	90-4512	1
23	Capacitor, Cover***	90-6325	1
24	Screw, 3/8" Metal***		4
25	Fan, 4 1/2" Sq., 1 1/5" DP, 115V 16W/.19A	20-3400	1
26	Connector, Aluminum 3/8" MPT x 1/2" Flared	33-4135	1
27	Flared Nut, 1/2" Aluminum	33-4335	1
28	Heat Exchanger, 1/2" Aluminum	13-8025	1
29	Flared Nut, 1/2" Brass	33-1335	1
30	Connector, 1/2" MPT x 1/2" Brass Flared Fitting	33-1135	1
31	Check Valve with Unloader, 1/2" MPT	30-2125	1
32	Street Tee, 1/2"	33-1005	1
33	Connector, 1/8" MPT x 1/2" Compression	33-1104	1
34	Nut, 1/4" Compression	33-1305	1
35	Nipple Hex Reducer, 1/2" MPT x 1/4" MPT	33-1159	1
36	Pressure Switch with Unloader**		1
37	Compression Nut, 1/4"**		1
38	Tubing, 1/4" Copper 8"		1
39	Pressure Switch Cover**		1
*	Compressor Repair Kit	90-9100	
**	Pressure Switch Assembly	20-6007	
***	Motor Assembly	90-9110	

FIELD UNIT ELECTRICAL DIAGRAM

MODEL NUMBER 2100M



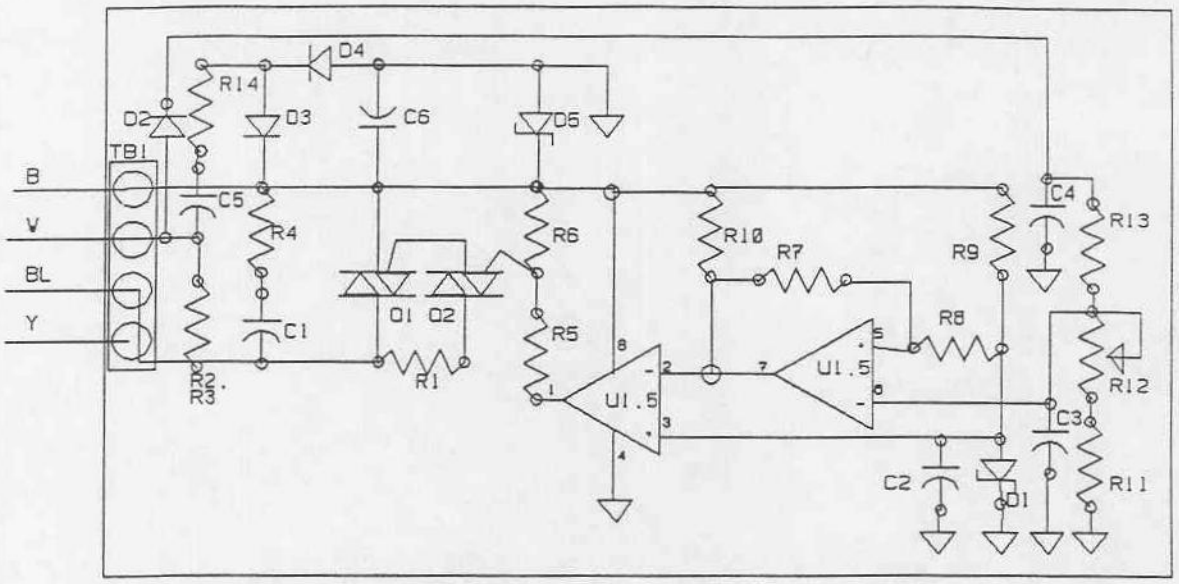
COMPRESSOR

B=BLACK
BL=BLUE
W=WHITE
G=GREEN
BN=BROWN
R=RED
O=ORANGE

WIRE:
14 GAUGE 600V
18 GAUGE 600V

PARTS LIST
M1=COMPRESSOR 1 1/2 HP
115/230 VAC 50/60 Hz
S4=PRESSURE SWITCH DPST
CN4=CONNECTOR 9 PIN

FIELD UNIT ELECTRICAL DIAGRAM
MODEL NUMBER 2100M



CIRCUIT BOARD
VOLTAGE SELECTION CIRCUIT

B=BLACK
W=WHITE
BL=BLUE
Y=YELLOW

WIRE:
18 GAUGE 600V

TB1=TERMINAL BLOCK 4 POLE

D1=VOLTAGE REFERENCE DIODE LM385BZ-1.2
D2=RECTIFIER DIODE IN4005
D3=RECTIFIER DIODE IN4005
D4=RECTIFIER DIODE IN4005
D5=REGULATOR DIODE NET142A

C1=.022 MICRO CAPACITOR
C2=.1 MICRO CAPACITOR
C3=.1 MICRO CAPACITOR
C3=.1 MICRO CAPACITOR
C4=.47 MICRO CAPACITOR
C5=100 MICRO CAPACITOR

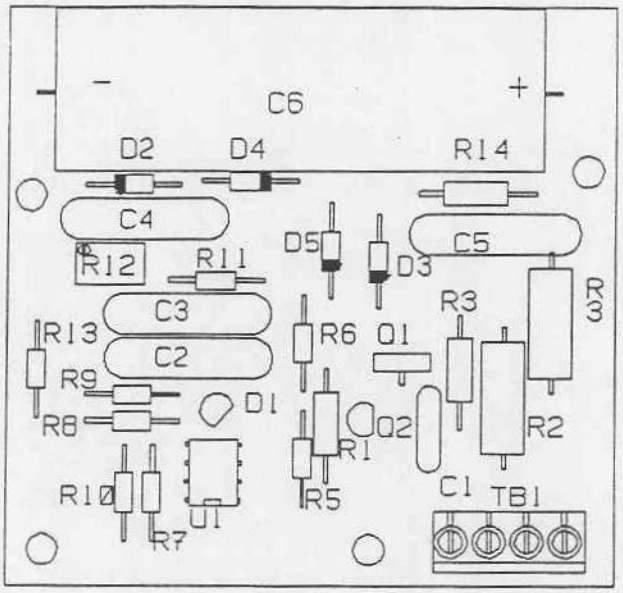
R1=390 RESISTOR 1W
NOTE R2,R3 ARE SHOWN AS ONE RESISTOR
R2=75K RESISTOR 3W
R3=75K RESISTOR 3W
R4=470 RESISTOR 1W
R5=2.2K RESISTOR 1/4W
R6=2.2K RESISTOR 1/4W
R7= 4.7M RESISTOR 1/4W
R8=47K RESISTOR 1/4W
R9=100K RESISTOR 1/4W
R10=100K RESISTOR 1/4W
R11=22K RESISTOR 1/4W
R12=20K POTENTIOMETER 1/2W
R13=4.7M RESISTOR 1/4W
R14=470 RESISTOR 1W

U1=OP-AMP DUAL COMPARATOR CA3290E

Q1=TRIAC NTE5605
Q2=TRIAC L401E3

VOLTAGE SELICTION
CIRCUIT

COMPONENT LAYOUT



TB1 TERMINAL BLOCK 4 POLE

D1 VOLTAGE REFERANCE DIODE
LM385BZ-1.2
D2 RECTIFIER DIODE 1N4005
D3 RECTIFIER DIODE 1N4005
D4 RECTIFIER DIODE 1N4005
D5 REGULATOR DIODE NET142A

C1 .022 MICRO CAPACITOR
C2 .1 MICRO CAPACITOR
C3 .1 MICRO CAPACITOR
C4 .1 MICRO CAPACITOR
C5 .47 MICRO CAPACITOR
C6 100 MICRO CAPACITOR

R1 390 RESISTOR 1W
R2 75K RESISTOR 3W
R3 75K RESISTOR 3W
R4 470 RESISTOR 1W
R5 2.2K RESISTOR 1/4W
R6 2.2K RESISTOR 1/4W
R7 4.7M RESISTOR 1/4W
R8 47K RESISTOR 1/4W
R9 100K RESISTOR 1/4W
R10 100K RESISTOR 1/4W
R11 22K RESISTOR 1/4W
R12 20K POTENTIOMETER 1/2W
R13 4.7M RESISTOR 1/4W
R14 470 RESISTOR 1W

U1 OP-AMP DUAL COMPARTOR CA3290E

Q1 TRIAC NTE5605
Q2 TRIAC L401E3

FIELD UNIT ELECTRICAL DIAGRAM

MODEL NUMBER 2100M

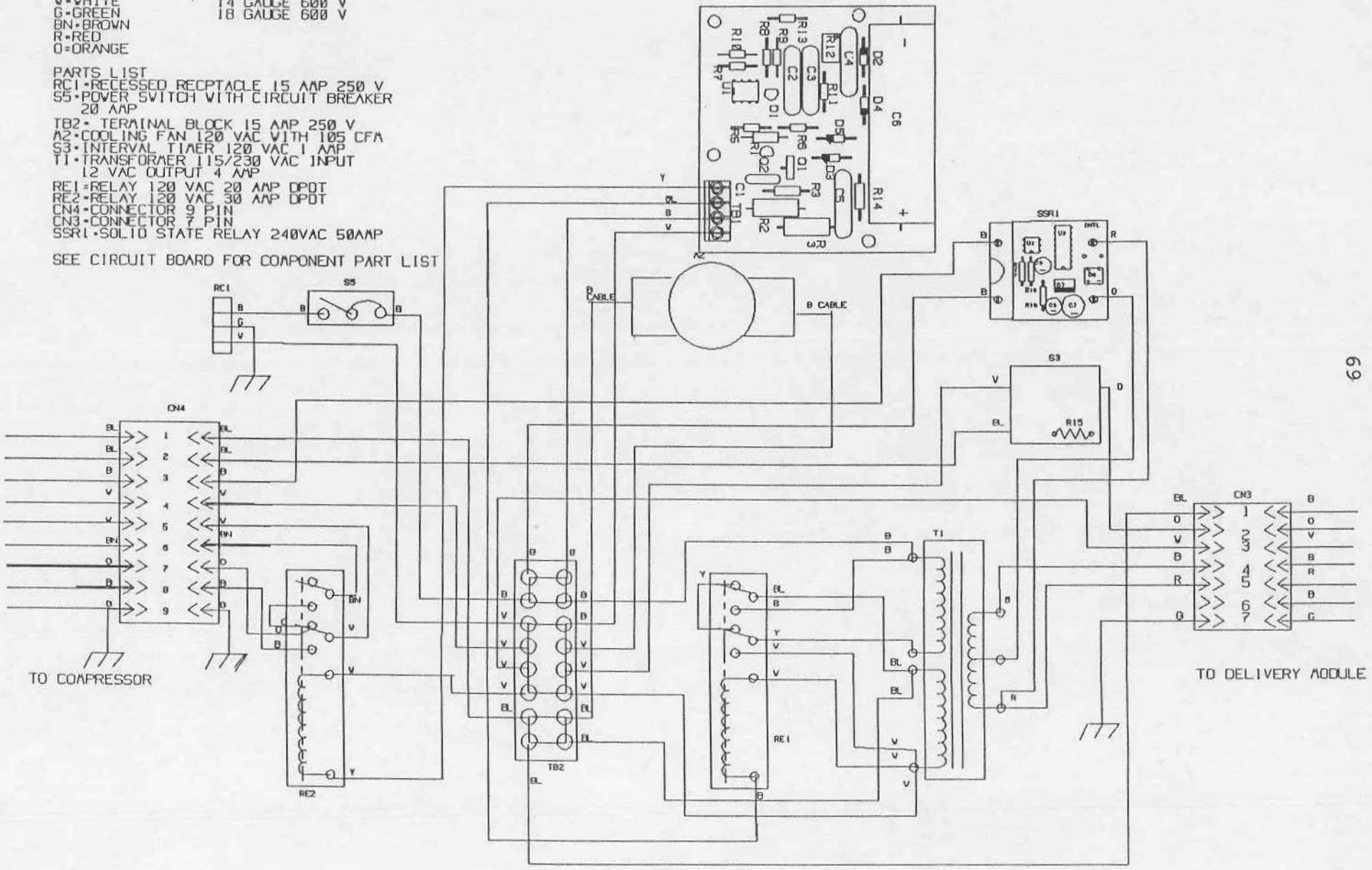
COMPRESSOR ELECTRICAL PANEL

B-BLACK
BL-BLUE
V-WHITE
G-GREEN
BN-BROWN
R-RED
O=ORANGE

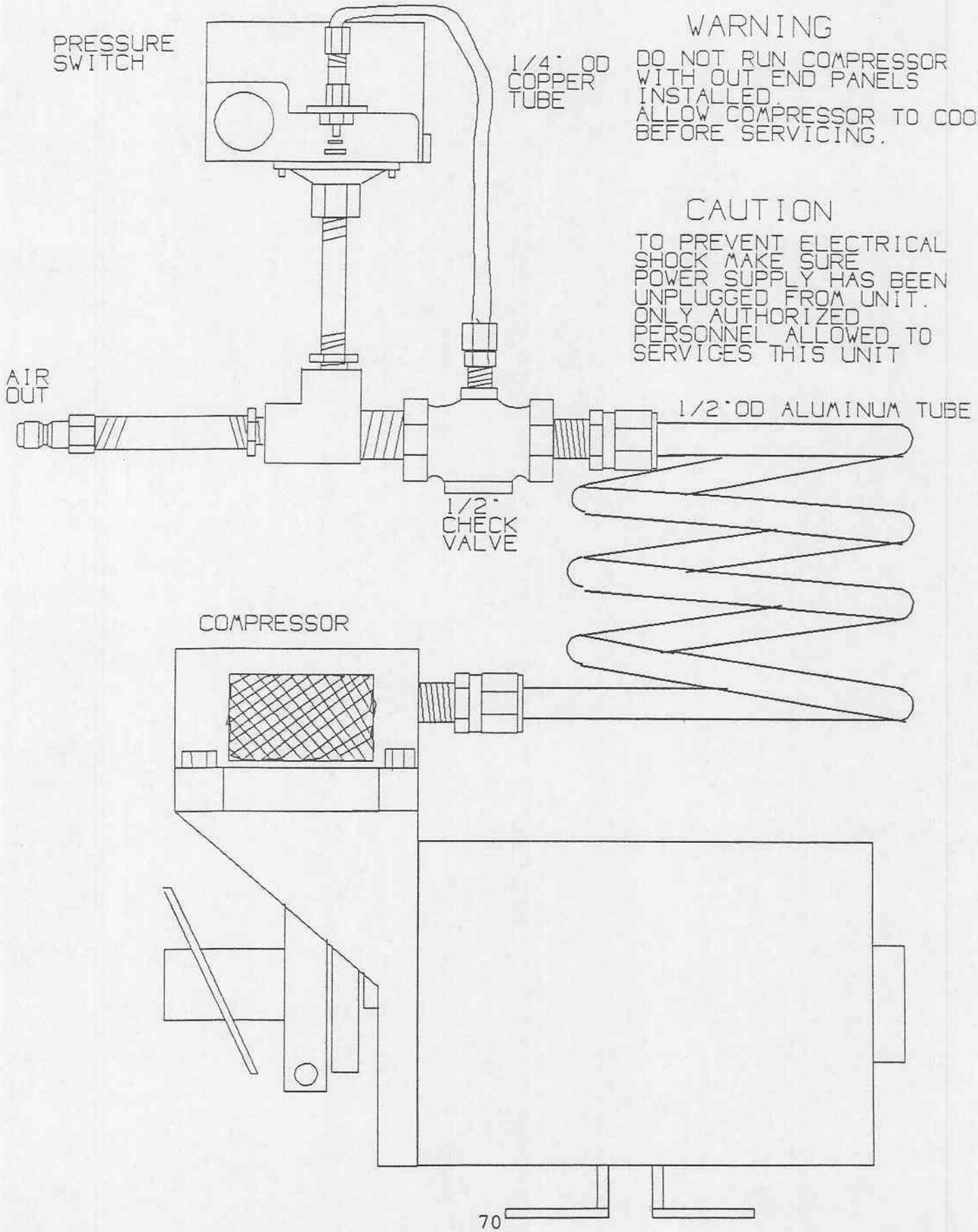
WIRE:
14 GAUGE 600 V
18 GAUGE 600 V

PARTS LIST
RC1-RECESSED RECPTACLE 15 AMP 250 V
S5-POWER SWITCH WITH CIRCUIT BREAKER 20 AMP
TB2- TERMINAL BLOCK 15 AMP 250 V
M2-COOLING FAN 120 VAC WITH 105 CFM
S3-INTERVAL TIMER 120 VAC 1 AMP
T1-TRANSFORMER 115/230 VAC INPUT 12 VAC OUTPUT 4 AMP
RE1=RELAY 120 VAC 20 AMP DPDT
RE2-RELAY 120 VAC 30 AMP DPDT
CN4-CONNECTOR 9 PIN
CN3-CONNECTOR 7 PIN
SSR1-SOLID STATE RELAY 240VAC 50AMP

SEE CIRCUIT BOARD FOR COMPONENT PART LIST



COMPRESSOR MODULE TUBING DIAGRAM



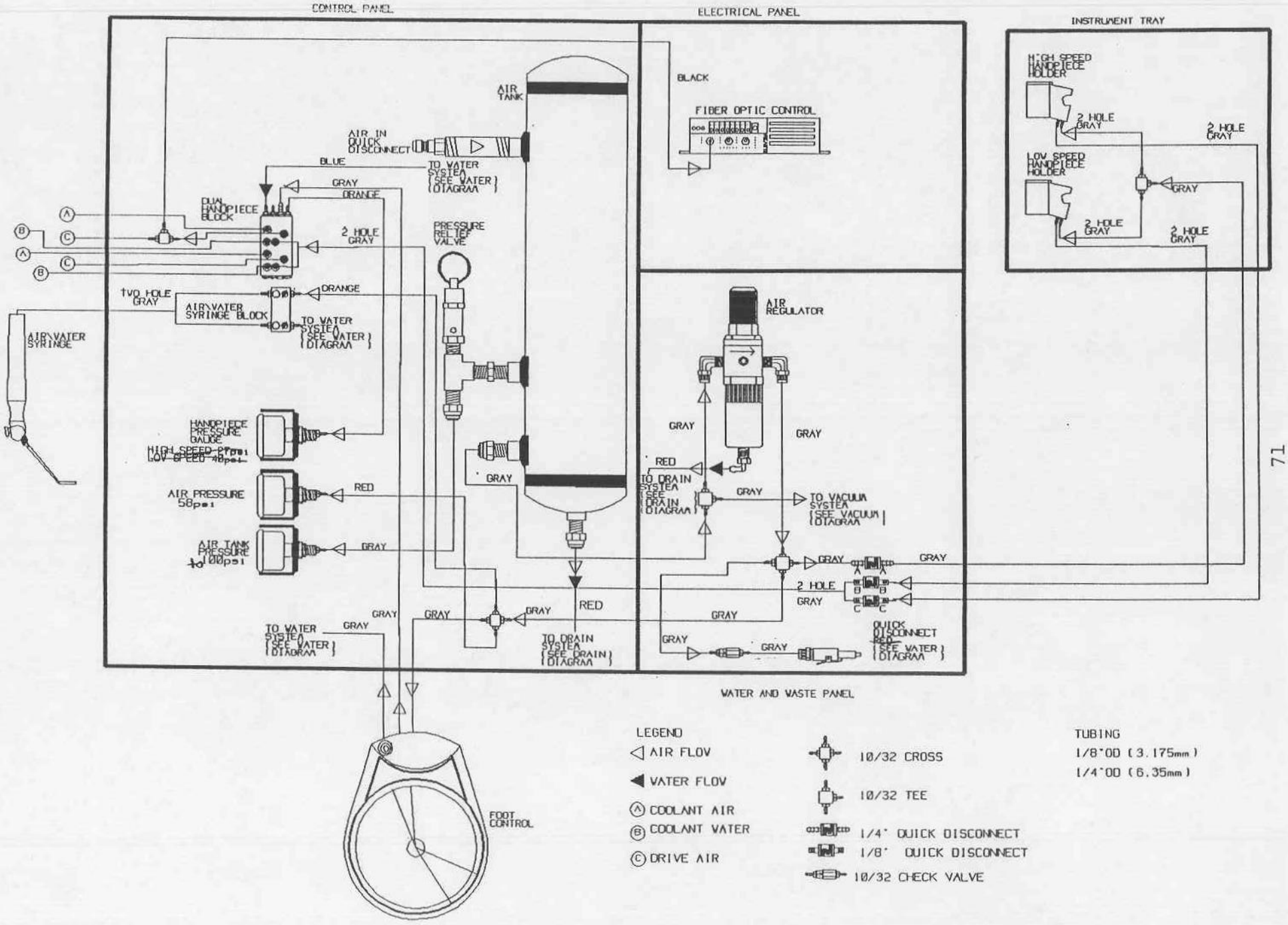
WARNING

DO NOT RUN COMPRESSOR WITH OUT END PANELS INSTALLED.
ALLOW COMPRESSOR TO COOL BEFORE SERVICING.

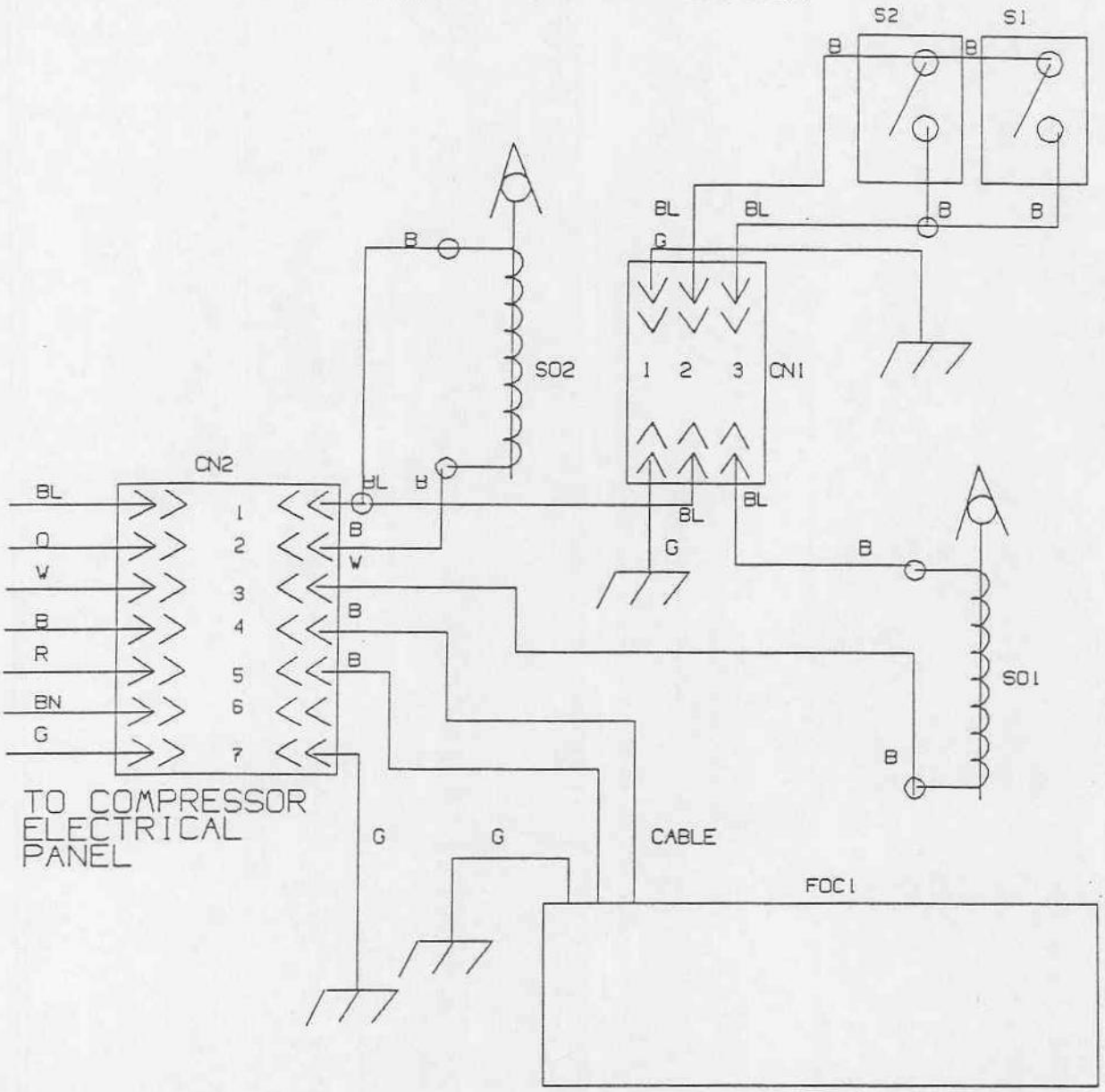
CAUTION

TO PREVENT ELECTRICAL SHOCK MAKE SURE POWER SUPPLY HAS BEEN UNPLUGGED FROM UNIT.
ONLY AUTHORIZED PERSONNEL ALLOWED TO SERVICES THIS UNIT

DELIVERY MODULE AIR DIAGRAM



FIELD UNIT ELECTRICAL DIAGRAM
MODEL NUMBER 2100M



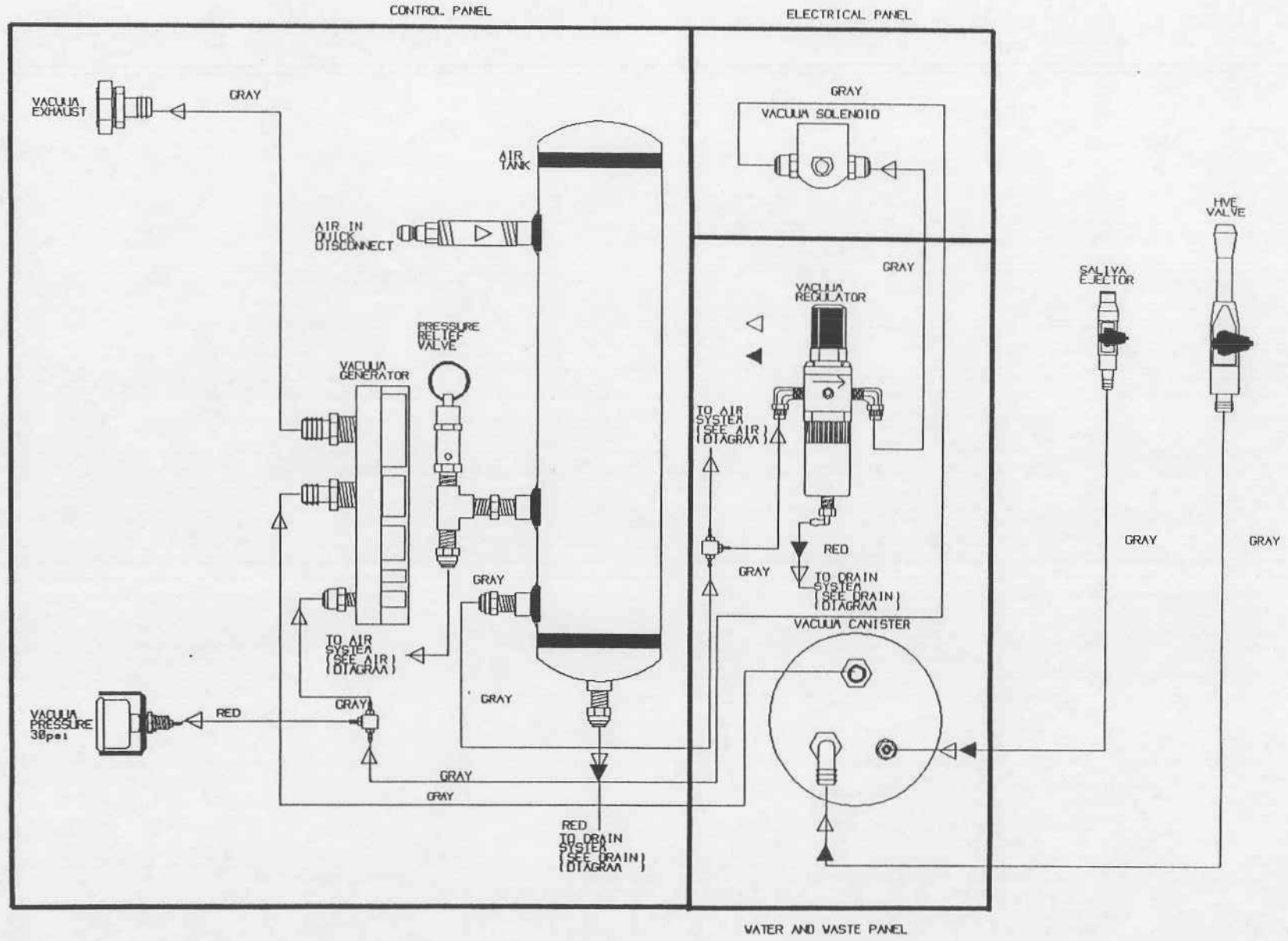
DELIVERY MODULE

B=BLACK
BL=BLUE
W=WHITE
G=GREEM
BN=BROWN
R=RED
O=ORANGE

WIRE:
18 GAUGE 600 V

CN1=CONNECTOR 3 PIN
CN2=CONNECTOR 7 PIN
S1=HVE SWITCH SPST
S2=LVE SWITCH SPST
SO1=SOLENOID VACUUM
SO2=SOLENOID AUTO DRAIN
FOC1=FIBER OPTIC CONTROL

DELIVERY MODULE VACUUM DIAGRAM



TUBING

1/8"OD (3.175mm)

1/4"OD (6.35mm)

3/8"OD (9.525mm)

11/16"OD (17.4625mm)

7/8"OD (22.225)

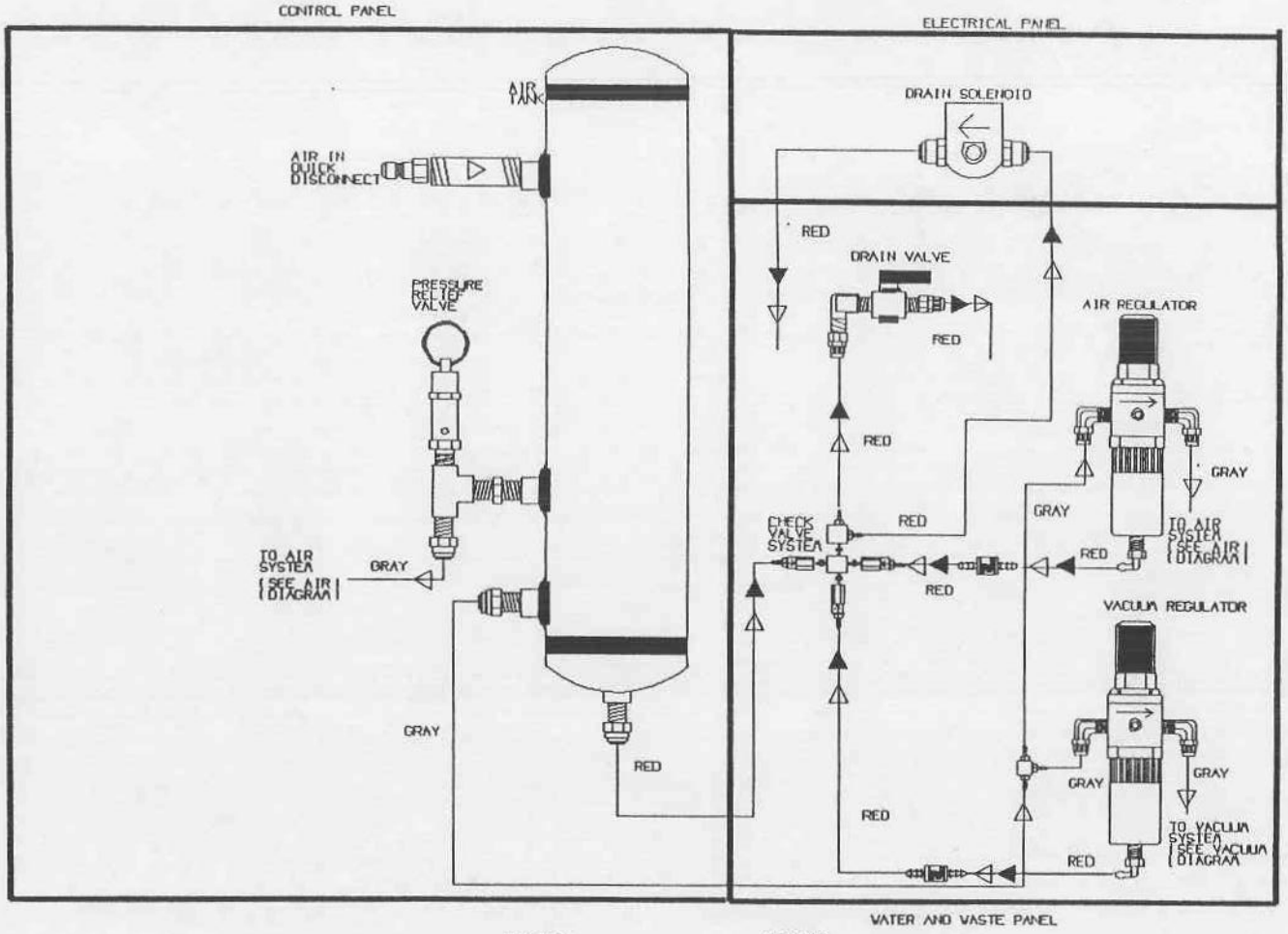
LEGEND

AIR FLOW

WATER FLOW

10/32 TEE

DELIVERY MODULE DRAIN DIAGRAM



LEGEND

- AIR FLOW
- WATER FLOW
- 10/32 HEX NIPPLE
- 10/32 TEE
- 1/4" QUICK DISCONNECT
- 10/32 CHECK VALVE

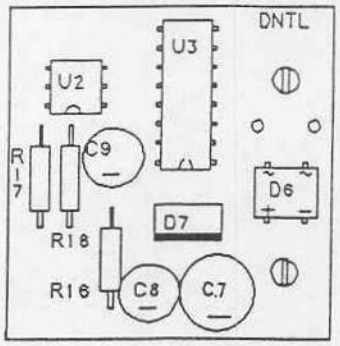
TUBING

1/8"OD (3.175mm)

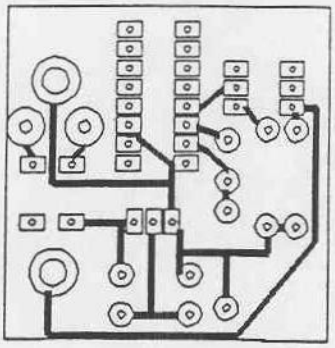
1/4"OD (6.35mm)

TIME DELAY CIRCUIT

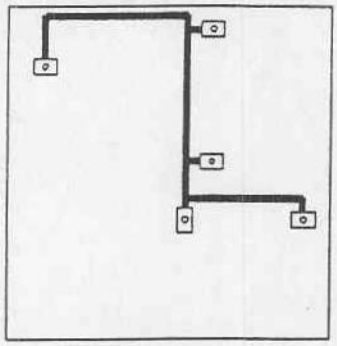
COMPONENT LAYOUT



TRACE BOTTOM VIEW



TRACE TOP VIEW



D6 DF005 BRIDGE RECTIFIER
D7 MC7805CT VOLTAGE REGULATOR

C7 1000 MICRO CAPACITOR
C8.C9 220 MICRO CAPACITOR

R16.R17 22K RESISTOR 1/4W
R18 330 RESISTOR 1/4W

U2 MOC3020 OPTOISOLATOR TRIAC
U3 SN74123N MONSTABLE MULTIVBRATOR